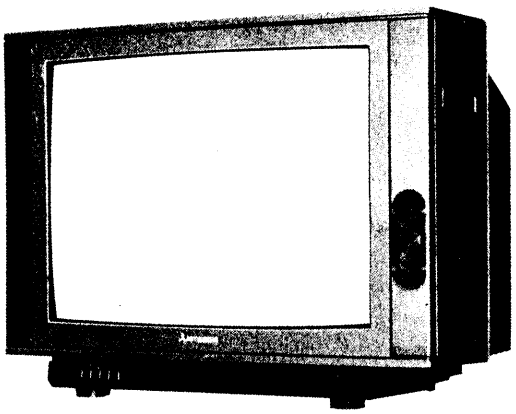
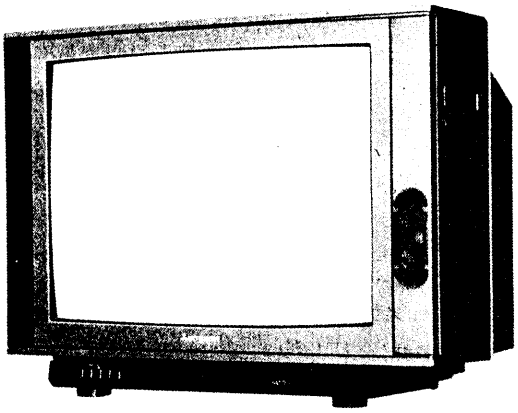
MARCH 1988

MITSUBISHI Service Manual



MODEL
CT-2145BM



MODEL
CT-2146TX

SPECIFICATIONS

Reception System	CCIR-I	
Colour System	PAL	
Channels	UHF 21~68	
Mains Input	AC240V 50Hz	
Power Consumption	89W (CT-2145BM), 95W (CT-2146TX)	
Aerial Input	75Ω	
Intermediate Frequency	Video	39.5MHz
	Sound	33.5MHz
	Colour	35.07MHz
Intercarrier Frequency	6.0MHz	
Audio Output	2.5W	
Speaker	Front 1-9/16" (4cm)×2-25/32" (7cm) Oval type Rear 4" (10cm)×5-7/8" (15cm) Oval type	
Chassis	EUR0 6	
Picture Tube	A51JCC30X01 90° Deflection	

Semiconductors

	(CT-2145BM)	(CT-2146TX)
Integrated Circuit	12	18
Transistors	25	33
Diodes	47	68
Positive Thermistor	1	1

Cabinet Dimensions	22-3/16"(W) × 17-13/16"(H) × 18-1/2"(D) 563mm 452mm 470mm
Weight	21.5kg (47.4 lbs)

Special Features

- 30 Programme Selection and Channel Position Number, or Programme Name Display System.
- Push Button Voltage Synthesizer Tuning System with Automatic Fine Tuning Function.
- 90/60/30 minutes Selectable OFF TIMER.
- On-Screen Indications as follows:
  Programme Name
  Optimum, Colour, Picture, B-Level, AV <for CT-2146TX> — With Tuning Switch OFF
  Off-Timer (Remaining Time), Volume, Sound Mute
  Channel Position Number, Programme Name, (Presetable) AFT, Rough Tuning Indication — With Tuning Switch ON
- Last Programme, Volume and Power On/Off Memory.
- 90° Deflection Picture tube with HI-BI Potential Focus System with TINT Glass.
- A Red LED Standby and on Indicator.
- Remote Control Hand Unit
  Infrared 30 Programme, Direct Access and 18 Functions. <for CT-2145BM>
  Infrared 30 Programme, Direct Access and 53 Functions. <for CT-2146TX>
  TV/VTR Common Use Facility
  FASTEXT Facility
- Video/Audio (monaural) Input <for CT-2146TX>
  : RCA PIN-JACK Type
- TELETEXT <for CT-2146TX>
  : FASTEXT

MITSUBISHI ELECTRIC (U.K.) LTD.
TRAVELLERS LANE, HATFIELD, HERTS. AL10 8XB

SAFETY PRECAUTIONS

NOTICE: Observe all cautions and safety related notes located inside the receiver cabinet and on the receiver chassis.

WARNING

1. Operation of these receivers outside the cabinet or with the cover removed, involves a shock hazard from the receiver power supplies. Work on the receiver should not be attempted by anyone who is not throughly familiar with precautions necessary when working on high voltage equipment.
2. Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while the picture tube is being handled. Keep the picture tube away from the body while handling.
3. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage area. Where a short-circuit has occurred, replace those components that indicate evidence of overheating.

LEAKAGE CURRENT COLD CHECK

Before returning the receiver to the customer, it is recommended that the leakage current be measured according to the following methods.

With the AC plug removed from the 240V AC source, place a jumper across the two AC plug prongs. Turn the receiver AC switch on. Using an OHM-METER, connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (antennas, screwheads, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistance reading of 1 megohm. Any resistance below this value indicates an abnormality which requires corrective action.

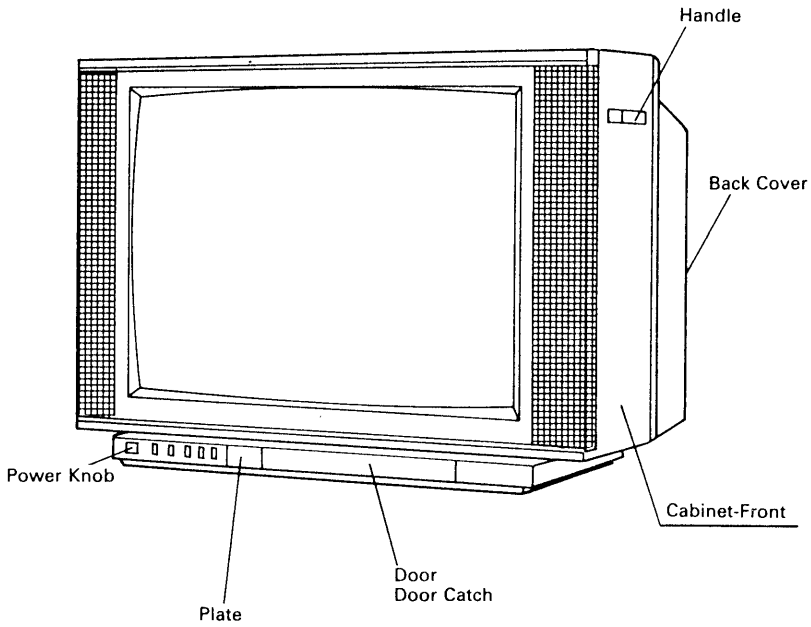


Fig. 1. (a) Cabinet Parts

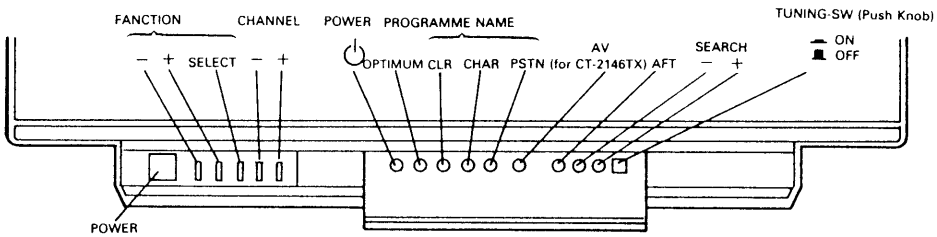


Fig. 1. (b) Controls

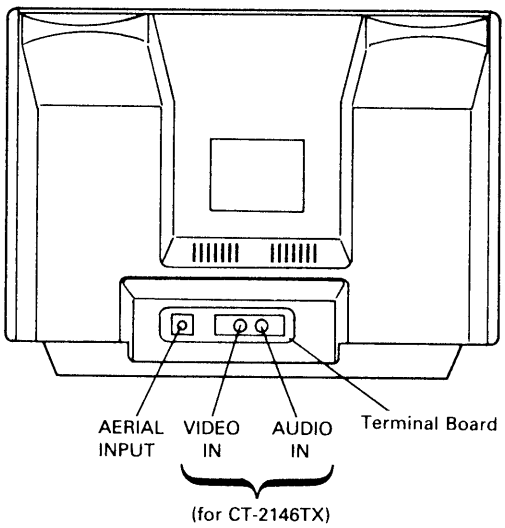
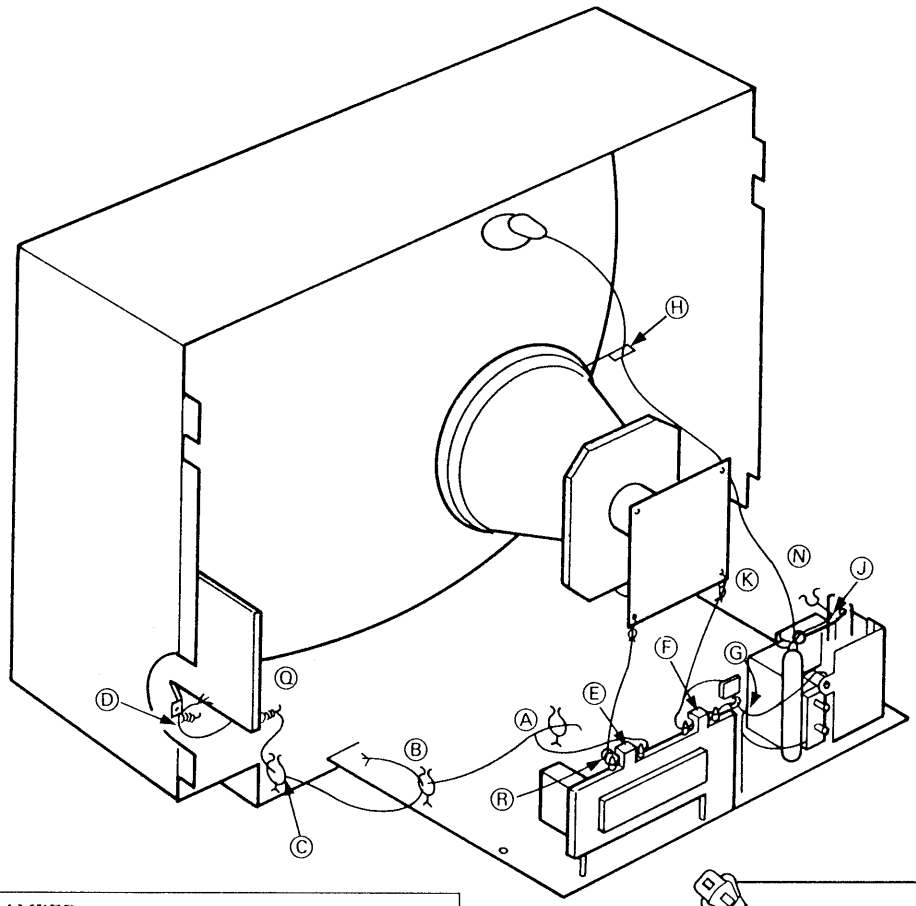
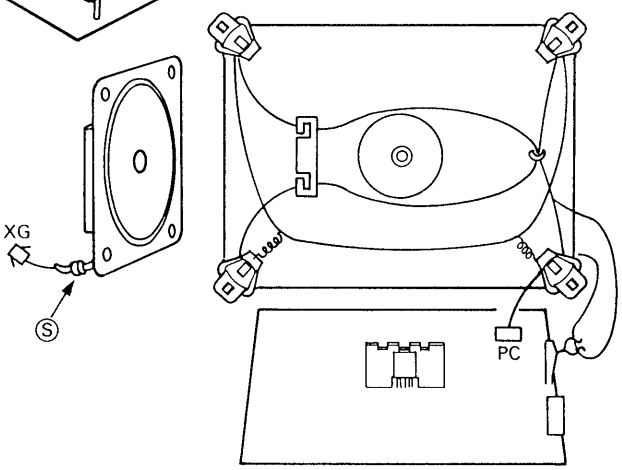
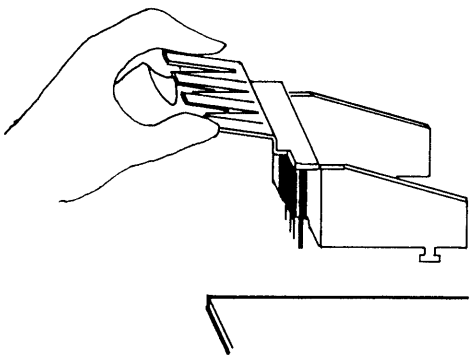


Fig. 1. (c) Rear View



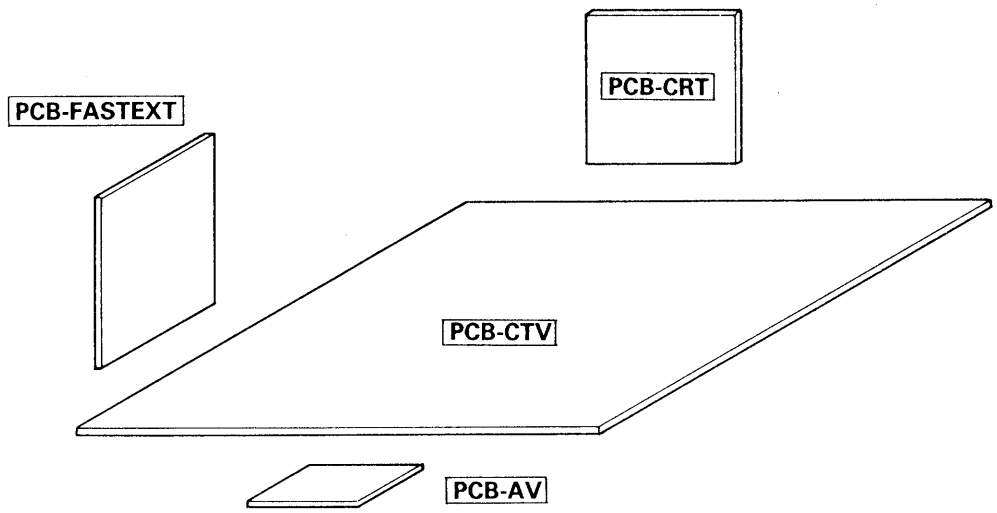
MARK	LEADS TO BE CLAMPED	
A	TX1, TX3, TD, CT, SP, AV	<CT-2146TX>
B	TX1, TX3, TD, SP, SF, SR (XG)	<CT-2146TX>
C	TX1, TX3, TD, SF, SR (XG)	<CT-2146TX>
D	TX1, TX3, TD	<CT-2146TX>
E	CT, PS	
F	PS, FOCUS LEAD, SCREEN LEAD	
G	PS, FOCUS LEAD, SCREEN LEAD [CUT THE EXTRA LENGTH]	
H	ANODE LEAD [USE THE UPPER HOLE]	
J	DY LEAD [USE THE UPPER HOLE]	
K	SA [2 LAYER CLAMP]	
A	CT, SP	<CT-2145BM>
B	SP, SR, SF	<CT-2145BM>
C	SR, SF	<CT-2145BM>
N	PC, AC-POWER-CORD [USE THE CENTRE HOLE]	
Q	TX1, TX3, TD	<CT-2145BM>
R	CT, PS [USE THE UPPER HOLE]	
S	XG	



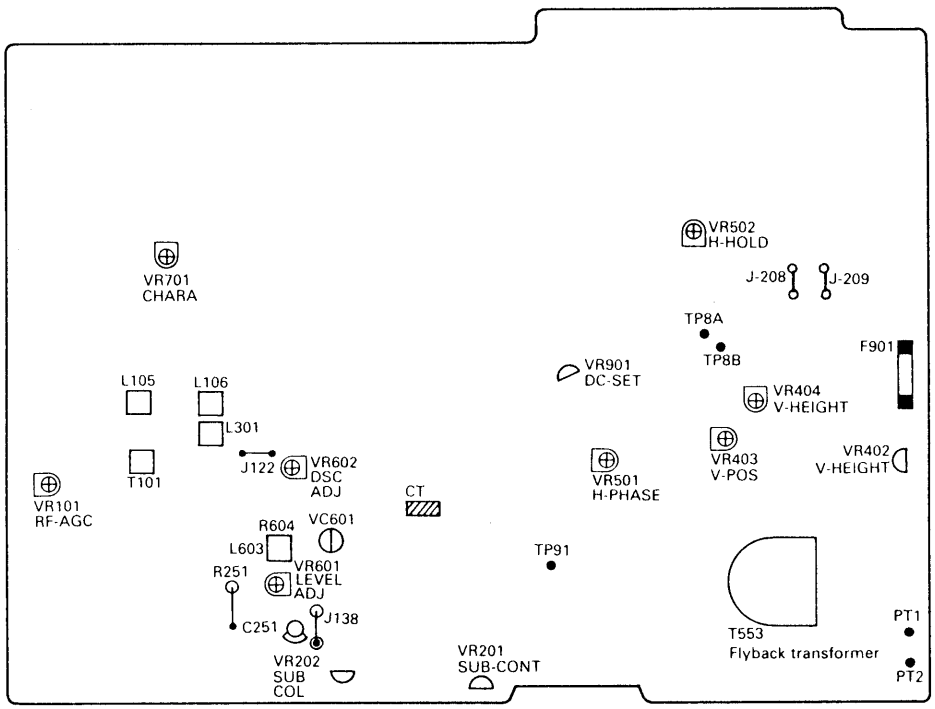


<Note> Replacement of IC901 and IC401
On replacing IC901 or IC401 disassemble it with the heat sink, as it is connected to the heat sink with screws.

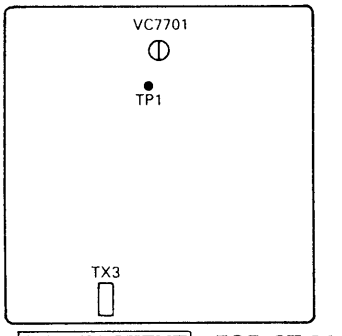
Fig. 2. Lead Dress



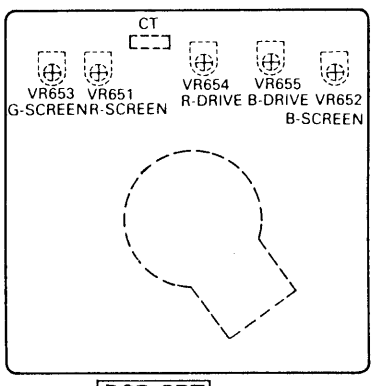
<FOR CT-2146TX>



PCB-CTV



PCB-FASTEXT <FOR CT-2146TX>



PCB-CRT

Fig. 3. Location of Controls on PCB

REPLACEMENT IC901 AND IC401
When replace IC901 and IC401, remove them together with the heat-sink.

RF AGC (VR101)

(1) Turn AFT on.
(2) Set channel selector to a channel where crossmodulation or overload exists.
(3) Turn RF AGC control VR101 slowly counterclockwise until the noise disappears.
(4) Check all channels available and make sure no noise or cross-modulation is observed.

SUB CONT (VR201)

(1) Tune receiver into a PAL colour bar signal.
(2) Press "OPTIMUM" button.
Set COLOUR control to minimum position.
(3) Finely adjust CRT-BIAS (SCREEN) control so that dark point does not brighten and blue bar is at normal condition. (Used G card signal).
(4) Connect a DC ammeter with 1mA full scale between the testpoint PT1(+) and PT2(−).
(5) Adjust SUB CONT control VR201 for beam current of $800\pm20\mu A$ on the meter.

SIF (L301)

(1) Tune receiver into a programme.
(2) Set volume control at a position where correct volume is obtained.
(3) Adjust L301 for maximum volume with minimum buzz.

V-HEIGHT (VR402)

Make sure the AC power supply voltage is at the specified value (240V).
(1) Tune receiver into a G-card signal.
(2) Press "OPTIMUM" button.
(3) Adjust HEIGHT control VR402 for normal vertical size.

HORIZONTAL FREQ CONTROL (VR502)

If there is difficulty in maintaining horizontal sync, adjust VR502.
(1) Tune receiver into a programme.
(2) Short circuit the test points TP8A and TP8B.
(3) Adjust H-HOLD control VR502 for near synchronization.
(4) Remove the shorting lead from TP8A and TP8B.

HORIZONTAL CENTERING (VR501)

(1) Tune receiver into a programme.
(2) Adjust H-HOLD control VR502 as described above.
(3) Adjust H-PHASE control VR501 to centre the picture.

V-POSITION (VR403)

(1) Tune receiver into a programme.
(2) Set V-POSITION control VR403 for optimum raster position.

FOCUS

(1) Tune receiver into a monochrome signal.
(2) Press "OPTIMUM" button.
(3) Adjust FOCUS control for best overall focus.

DC-SET (VR901)

(1) Tune receiver into a monochrome programme.
(2) Press "OPTIMUM" button.
(3) Make sure the mains voltage is 240V.
(4) Connect a DC voltmeter of 150V full scale between the TP91 (+) and the chassis ground (−).
(5) Adjust DC-SET control VR901 for voltage of 112±3V.

FASTEXT FREE RUN FREQUENCY ADJUSTMENT (6MHz)

Activate the decoder over 5 minutes for stabilization.
(1) Disconnect Antenna Cable from Antenna Terminal to display a snow noise on the screen.
(2) Connect Digital Frequency Counter to test point TP-1 on PCB-FASTEXT.
(3) Adjust VC7701 for 6000.2±0.2kHz.

DISPLAY POSITION (VR701)

This adjustment shall be conducted after the H-PHASE control VR501 adjustment have been completed.
(1) Tune receiver to a G-Card signal.
(2) Push "OPTIMUM" button and adjust DISPLAY POSITION control VR701 so that the optimum display shall be in the middle of the horizontal width of the picture. (Fig. 4).

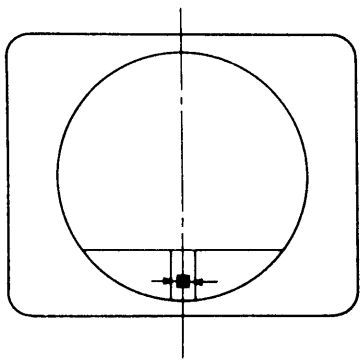


Fig. 4. DISPLAY POSITION

CHROMA CIRCUITS

PAL CIRCUIT

FREE RUN FREQUENCY (VC601, VR602)

(1) Tune receiver to PAL colour bar signal.
(2) Connect J-122 and J-138.
(3) Short-circuit the resistor R604 (Short-lead length should not exceed 2 cm (13/16").)
(4) <CT-2145BM>
Adjust OSC ADJ control VR602 for almost colour synchronization.
<CT-2146TX>
Adjust OSC ADJ control VC601 for almost colour synchronization.
(5) Remove the short-lead.

VECTOR (VR601, L603)

(1) Tune receiver into G-card signal.
(2) Turn AFT on and confirm the AFT operation.
(3) Press "OPTIMUM" button.
(4) Set the oscilloscope to the X-Y mode and connect pin ③ of the connector CT to the horizontal axis (X) and pin ⑤ of the connector CT to the vertical axis (Y).
(5) Adjust LEVEL-ADJ control VR601 so that the right points shall gather to point "a" shown in Fig. 5.
(6) Adjust TRANS DL OUT control L603 so that the outward double dots and the bright point at the point "b" shown in Fig. 5 draw together.

COLOUR OUTPUT (VR202)

This adjustment shall be conducted after the VECTOR, Grey Scale and SUB-CONT adjustments have been completed.

(1) Tune receiver to PAL colour bar signal.
(2) Connect the oscilloscope to pin ③ of the connector CT .
(3) Press "OPTIMUM" button.
(4) Adjust SUB-COLOUR control VR202 so that the tops of the waveforms shall be flat as shown in Fig. 6.

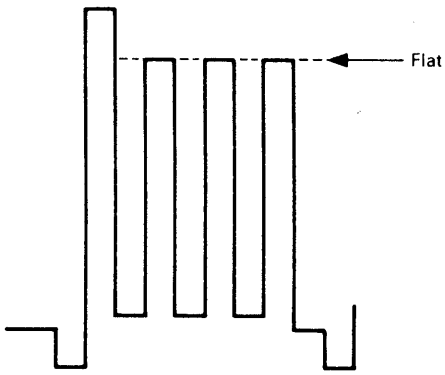
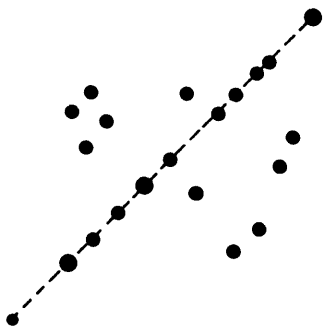


Fig. 6. Wave form of colour output



(a) Condition adjusted correctly

(b) Condition missed adjusting

Fig. 5. Vector Pattern of G card-Signal

PURITY AND CONVERGENCE

Procedure

(1) Remove the deflection yoke and the rubber wedges from the picture tube cone taking care not to strike or scratch the cone.
(2) Clean the cement remaining on the deflection yoke and the surface of the picture tube cone.
(3) Tune receiver into a cross-hatch signal.
(4) Fit the deflection yoke on the neck of picture tube and push forward.
(5) Fit C.P. (Magnet) Assembly to the neck of the picture tube and fasten with the screw at the position were the distance between 6-pole magnet end and the base of picture tube is as shown in Fig. 7.
(6) Demagnetise at the front and sides of the picture tube with a degaussing coil.

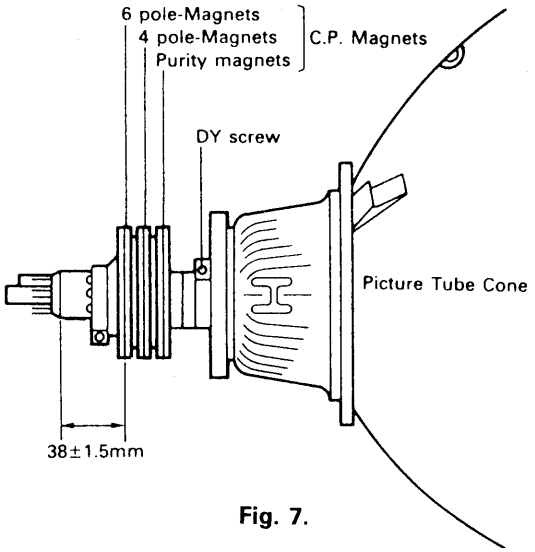


Fig. 7.

Preliminary Adjustment

1. Purity

(1) Short-circuit the base and emitter of B-OUT transistor to produce yellow raster.
(2) With the deflection yoke positioned fully forward, adjust purity magnets so that the yellow vertical bar is at the centre of the screen. (Fig. 8)
(3) Slide the deflection yoke slowly backwards to produce a uniform yellow raster.
(4) Remove the shorting link on B-OUT transistor.
(5) Short-circuit the base and emitter of corresponding two transistors as indicated in Table 1 to produce green, red, and blue rasters and to verify their purity, and fasten the DY screw on the deflection yoke temporarily.
(6) Remove the shorting leads from respective transistors.

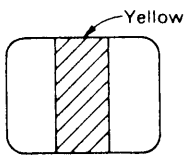


Fig. 8. Screen

Table 1 Transistors to be Shorted Base to Emitter to Produce Primary Colour

Raster \ Transistor	R-OUT	G-OUT	B-OUT
Red	Open	Short	Short
Green	Short	Open	Short
Blue	Short	Short	Open

2. Static Convergence

(1) Press "OPTIMUM" button.
(2) Adjust two 4-pole magnets to converge red and blue vertical and horizontal lines at the centre of the screen.
(3) Adjust two 6-pole magnets to converge the red and blue lines on the green line at the centre of the screen.

Note:
1. Adjustment of 4-pole magnets affects red and blue beams.
2. Adjustment of 6-pole magnets affects red and blue beams onto the green beam. (Fig. 9)

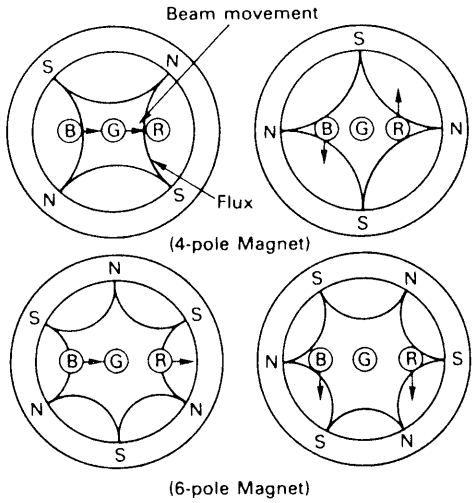


Fig. 9.

3. Focus

If necessary, adjust focus. Ascertain that focus is optimum throughout the entire screen. Do not adjust focus after the following adjustments.

Regular Adjustment

1. Purity

(1) Short-circuit the base and emitter of B-OUT transistor to produce yellow raster.
(2) Loosen the deflection yoke screw and move it forwards and check that the yellow vertical bar is at the horizontal centre. (Fig. 8)
If necessary, adjust purity magnets.
(3) Slide the yoke backwards to produce a uniform yellow raster.

(4) Short-circuit the base and emitter of corresponding two transistors as indicated in Table 1 to produce green, red, and blue rasters and verify their purity, then fasten the DY screw of the deflection yoke temporarily.
(5) If necessary, repeat steps above.
(6) Fix the yoke in position using the DY screw.

Note: When adjusting the deflection yoke position, do not touch the purity ring magnets except where necessary.

2. Static Convergence

(1) Tune receiver into a cross-hatch signal or test card.
(2) Press "OPTIMUM" button.
(3) Adjust 4-pole magnets to converge red and blue vertical and horizontal lines at the centre of the screen.
(4) Adjust 6-pole magnets to converge the red and blue lines converged on the green lines.
(5) If necessary, repeat steps (3) and (4) above.

3. Periphery of Convergence

(1) Observe the horizontal lines at the centre of screen. If the red and blue horizontal lines are shifted crossing with green horizontal lines as shown in Fig. 9 (A), converge them by swinging yoke vertically.
Then confirm that vertical lines at the screen centre are also converged.
(2) Observe the vertical lines at left and right centres of the screen as shown in Fig. 9 (B). If red or blue vertical lines are shifted against green vertical line, converge them by swinging yoke horizontally. Then confirm that the horizontal lines both at top and bottom centres of the screen are also converged.
(3) The shift of beams as shown in Fig. 9 (C) can be converged by rotating the entire deflection yoke. The rotation of the yoke should be made in consideration of a point where raster rotation and convergence compromise.

Note: Never perform focus adjustment after convergence adjustments. If focus is adjusted after convergence adjustment, check convergence again.

(4) Push the three rubber wedges between the picture tube cone and the deflection yoke at the positions indicated in Fig. 10.
(5) Observe the entire screen and make sure convergence adjustment is complete. If necessary, change the positions of the wedges and repeat steps (1) and (2) above.
(6) After the position of the wedges have been decided, gently turn up the end of the wedge and strip the tape from the rear of the end to expose the adhesive material, then adhere to the picture tube cone. (Fig. 11)

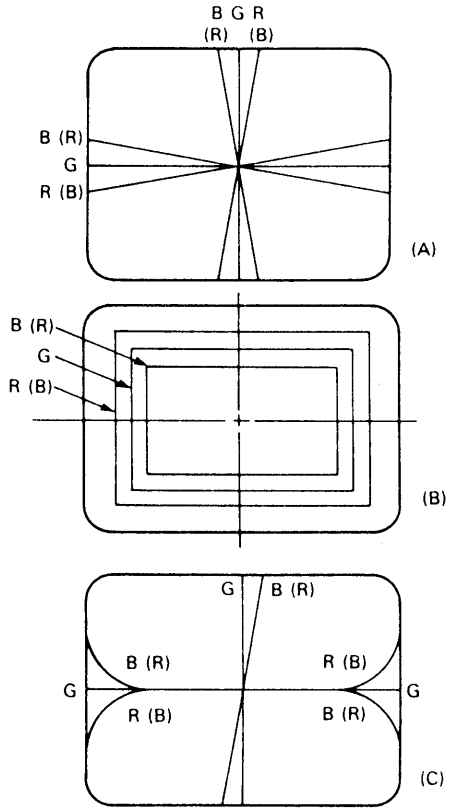


Fig. 9.

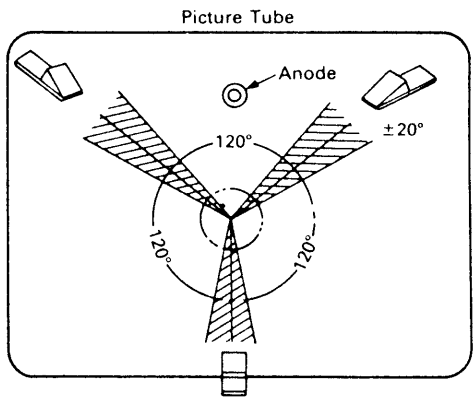


Fig. 10.

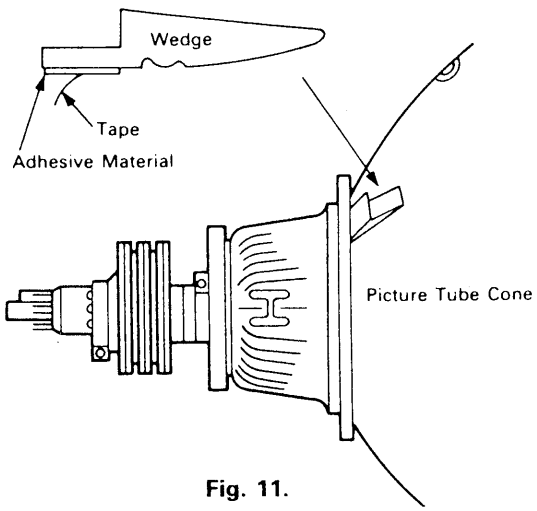


Fig. 11.

GREY SCALE

Grey scale adjustment procedure described below may be necessary when replacing picture tube or PCB-CRT.

(1) Connect 1/4W 390Ω-J between IC101 ③ pin and a ground.
For AV models set it to the null signal condition in the AV mode.
(2) Set the following variable resistors to the specified positions.
Drive control VR654 and VR655:
Extreme counterclockwise position (on the foil side)
SUB-CONT control VR201:
Nearly in the middle position
Screen control of T553 (Flyback transformer):
Extreme counterclockwise position
(3) By-pass the R666. (short-lead)
(4) Connect the oscilloscope to Q651 and Q653 collector in turn. Connect the ground prove to the pin ② of connector [CT] .
(5) Adjust SCREEN control VR651 to VR653 so that the PEDESTAL LEVEL of each collector shall be 160V.
(6) Short-circuit the service terminals J208 (S) and J209 (B).
(The screen shows one horizontal line.)
(7) Adjust the SCREEN control of the T553 (Flyback Transformer) so that one of red, green, and blue begins to appear.
(8) Adjust two of VR651, VR652 and VR653 so that other two colours shall become bright.
(9) Remove the short lead from R666 and service terminal. Then Remove the resistor from IC101 ③ pin or re-set the null signal condition in the AV mode to the TV mode.
(10) Tune receiver into a monochrome signal.
(11) Adjust red and blue DRIVE controls VR654 and VR655 to obtain a pure peak white raster.

PARTS LIST CT-2145BM
CT-2146TX

In order to expedite delivery of replacement part orders.

Specify : 1.Model number/Serial number
2.Part number and Description
3.Quantity

Unless full information is supplied,delay in execution of orders will result.

⚠ : Critical components

RESISTOR / CAPACITOR

MARK	TOLERANCE	MARK	TOLERANCE	MARK	TOLERANCE
J	±5%	J	±5%	Z	+80% −20%
K	±10%	K	±10%	C	±0.25pF
M	±20%	M	±20%	D	±0.5pF
N	±30%	P	+100% − 0%	F	±1pF
				Q	+30% −10%

C

SYMBOL NO.	PART NO.	DESCRIPTION	
TUNER AND TUBE			
TU101	295P69809	TUNER	ENV-87817F2
⚠ V 271	251P27501	CATHODE RAY TUBE	A51JCC30X
INTEGRATED CIRCUIT			
IC101	272P15001	M51496P	
IC251	272P14801	TDA3561A	(CT-2146TX)
IC252	272P24701	TDA3565	(CT-2145BM)
IC361	266P51201	AN5265	
IC401	266P40401	UPC1378H	
IC501	272P14701	TDA2579	
IC701	272P09002	M50439-562SP	(CT-2145BM)
IC701	272P09003	M50439-563SP	(CT-2146TX)
IC702	272P06401	M58630P	
IC703	266P13003	PST520E	
IC704	266P01002	μ PC574J	
IC7704	272P19301	MAB8461P	(CT-2146TX)
IC7705	272P09602	SAA5231	(CT-2146TX)
IC7706	272P09505	SAA5243	(CT-2146TX)
IC7707	263P76501	TC5565P-12	(CT-2146TX)
IC7708	272P19201	PCD8572	(CT-2146TX)
IC901	267P92401	STR54041	
IC902	266P93404	μ PC7812H	
IC903	266P92201	μ PC78M05H	(CT-2146TX)
IC951	266P92201	μ PC78M05H	
TRANSISTORS			
Q 104	260P54302	JC501-Q-R	
Q 201	260P54405	JA101-Q.R	(CT-2146TX)
Q 202	260P54302	JC501-Q-R	(CT-2146TX)
Q 2E1	260P54302	JC501-Q-R	(CT-2145BM)
Q 2E1	260P54405	JA101-Q.R	(CT-2146TX)
Q 2E2	260P54405	JA101-Q.R	
Q 2E3	260P54302	JC501-Q-R	(CT-2145BM)
Q 2E4	260P54302	JC501-Q-R	
Q 2E5	260P54302	JC501-Q-R	(CT-2146TX)
Q 301	260P54302	JC501-Q-R	
Q 302	260P54302	JC501-Q-R	
Q 3E1	260P54302	JC501-Q-R	
Q 401	260P54405	JA101-Q.R	
Q 551	260P51002	BF419	
Q 552	260P60701	2SD1878	
Q 651	260P42507	2SC2688-M.N	
Q 652	260P42507	2SC2688-M.N	
Q 653	260P42507	2SC2688-M.N	
Q 654	260P54405	JA101-Q.R	
Q 701	260P33805	2SC2603-G	
Q 702	260P54302	JC501-Q-R	
Q 703	260P54302	JC501-Q-R	(CT-2146TX)
Q 703	260P54405	JA101-Q.R	(CT-2145BM)
Q 704	260P54302	JC501-Q-R	(CT-2146TX)
Q 705	260P54302	JC501-Q-R	
Q 706	260P54405	JA101-Q.R	
Q 7701	260P54305	JC501-Q	(CT-2146TX)
Q 7702	260P54305	JC501-Q	(CT-2146TX)
Q 7703	260P54305	JC501-Q	(CT-2146TX)
Q 7705	260P54305	JC501-Q	(CT-2146TX)
Q 7706	260P54302	JC501-Q-R	(CT-2146TX)
Q 901	260P38701	2SC2236-OY	
Q 951	260P61001	2SC4004	
Q 953	260P33805	2SC2603-G	
Q 954	260P61101	2SD965-R	
Q 955	260P54302	JC501-Q-R	
DIODES			
D 105	264P46305	EQA02-09CD	
D 201	264P37001	1N4148	(CT-2146TX)
D 202	264P37001	1N4148	(CT-2146TX)
D 204	264P37001	1N4148	(CT-2146TX)
D 251	264P46504	EQA02-12AB	
D 252	264P46504	EQA02-12AB	
D 253	264P46504	EQA02-12AB	
D 254	264P37001	1N4148	
D 361	264P37001	1N4148	
D 362	264P46502	EQA02-11C	
D 3E1	264P37001	1N4148	
D 401	264P37401	1N4003G	
D 501	264P37001	1N4148	
D 502	264P37001	1N4148	
D 553	264P37702	BYW95B	

SYMBOL NO.	PART NO.	DESCRIPTION	
D 554	264P37101	BYD33G	
D 555	264P37401	1N4003G	
D 559	264P37001	1N4148	
D 560	264P37001	1N4148	
D 702	264P37001	1N4148	
D 703	264P37001	1N4148	
D 709	264P37001	1N4148	
D 710	264P37001	1N4148	
D 712	264P37001	1N4148	
D 717	264P37001	1N4148	
D 718	264P37001	1N4148	(CT-2145BM)
D 719	264P37001	1N4148	
D 721	264P46408	EQA02-11C.D	
D 722	264P46408	EQA02-11C.D	
D 723	264P46408	EQA02-11C.D	
D 724	264P46408	EQA02-11C.D	
D 725	264P37001	1N4148	
D 726	264P37001	1N4148	(CT-2146TX)
D 727	264P37001	1N4148	
D 728	264P37001	1N4148	(CT-2146TX)
D 729	264P37001	1N4148	(CT-2146TX)
D 730	264P39301	SLC-26VR5	
D 731	264P37001	1N4148	
D 732	264P37001	1N4148	
D 733	264P37001	1N4148	
D 734	264P37001	1N4148	
D 735	264P37001	1N4148	
D 736	264P37001	1N4148	
D 737	264P37001	1N4148	(CT-2145BM)
D 738	264P37001	1N4148	(CT-2145BM)
D 7701	264P37001	1N4148	(CT-2146TX)
D 7702	264P37001	1N4148	(CT-2146TX)
D 7703	264P37001	1N4148	(CT-2146TX)
D 7705	264P37001	1N4148	(CT-2146TX)
D 7706	264P37001	1N4148	(CT-2146TX)
D 7707	264P46002	EQA02-05CD/RD5.1EB1	(CT-2146TX)
D 7708	264P37001	1N4148	(CT-2146TX)
D 901	264P37601	BYW56	
D 902	264P37601	BYW56	
D 903	264P37601	BYW56	
D 904	264P37601	BYW56	
D 905	264P37101	BYD33G	
D 909	264P37101	BYD33G	
D 910	264P37201	BYV96E	
D 911	264P37702	BYW95B	
D 912	264P37802	BYW96E	
D 913	264P37702	BYW95B	
D 914	264P37702	BYW95B	(CT-2146TX)
D 916	264P37101	BYD33G	
D 952	264P37201	BYV96E	
D 953	264P46506	EQA02-12B	
D 954	264P37101	BYD33G	

SYMBOL NO.	PART NO.	DESCRIPTION	
D 955	264P37401	1N4003G	
D 956	264P37401	1N4003G	
D 957	264P47001	EQA02-30AC/RD30EB3.	
D 958	264P37001	1N4148	

OTHER SEMICONDUCTORS

RP901	265P07105	POSITIVE THERMISTOR	PTH451C41BG180N

FILTERS

CF101	296P02404	CERAMIC FILTER	TPS6.0MB
CF301	296P01403	CERAMIC FILTER	SFE-6.0MA
CF701	299P04601	CERAMIC RESONATOR	
SF101	296P03406	SAW FILTER	KAF-39.5MR-MB

DELAY LINES

DL251	337P11402	DELAY LINE	
DL601	337P02703	DELAY LINE	SDL-145

COILS

⚠		409B04104	DEGAUSSING	
	L 101	321C04105	RF	JISC-3212-0.4
	L 103	325C10603	PEAKING	10 μH-J
	L 105	323P17501	VIF	LLD-TANK (38.9 39.5MHz)
	L 106	323P17509	VIF	AFT (38.9 39.5MHz)
	L 108	321C03005	RF	2.2 μH-K
	L 2E1	325C10104	PEAKING	12 μH-K
	L 301	327P07401	SIF	5.5/6.0MHz
	L 304	321C03106	RF	15 μH-K
	L 491	330P10001	DEFLECTION YOKE	
	L 551	321C03001	RF	1 μH-K
	L 553	411D00902	FERRITE CORE FILTER	
	L 555	409P00608	FILTER	
	L 556	333P01203	HORIZONTAL LIN.	
	L 602	325C10603	PEAKING	10 μH-J
	L 603	349P16901	DL OUT	DL-MATCH-4.43MHz
	L 701	325C12201	PEAKING	47 μH-K
	L 702	325C12201	PEAKING	47 μH-K
	L 703	325C12201	PEAKING	47 μH-K
	L 704	325C12201	PEAKING	47 μH-K
	L 708	325C11101	PEAKING	1 μH-K (CT-2146TX)
	L 709	325c11009	PEAKING	4.7 μH-K
	L 7701	321C03106	RF	15 μH-K (CT-2146TX)
	L 7703	325C11103	PEAKING	10 μH-K (CT-2146TX)
	L 992	351P04401	LINE FILTER	AT4043/90

TRANSFORMERS

T 101	323P17401	VIF	38MHz
T 551	336P00901	H.DRIVE	

SYMBOL NO.	PART NO.	DESCRIPTION
⚠ T 553	334B08109	FLYBACK
⚠ T 901	350P39901	POWER
⚠ T 951	350P37501	POWER

VARIABLE RESISTORS

VR101	127C08005	VR-SEMIFIXED	1/5W B2K Ω -M
VR201	127C03102	VR-SEMIFIXED	1/5W B100K Ω -N
VR202	127C03102	VR-SEMIFIXED	1/5W B100K Ω -N
VR402	127C18103	VR-SEMIFIXED	1/5W B200K Ω -M
VR403	127C08006	VR-SEMIFIXED	1/10W B3K Ω -N
VR501	127C08101	VR-SEMIFIXED	1/5W B50K Ω -M
VR502	127C08008	VR-SEMIFIXED	1/5W B10K Ω -M
VR601	127C08005	VR-SEMIFIXED	1/5W B2K Ω -M
VR602	127C08008	VR-SEMIFIXED (CT-2145BM)	1/5W B10K Ω -M
VR651	127C02007	VR-SEMIFIXED	1/5W B5K Ω -N
VR652	127C02007	VR-SEMIFIXED	1/5W B5K Ω -N
VR653	127C02007	VR-SEMIFIXED	1/5W B5K Ω -N
VR654	127C02004	VR-SEMIFIXED	1/5W B1K Ω -N
VR655	127C02004	VR-SEMIFIXED	1/5W B1K Ω -N
VR701	127C08007	VR-SEMIFIXED	1/5W B5K Ω -M
VR901	127C08102	VR-SEMIFIXED	1/5W B100K Ω -M

RESISTORS

⚠ R 361	103P41808	CARBON	1/4W 4.7 Ω -J
R 556	109D06706	CEMENT WIRE	10W 12 Ω -J
⚠ R 559	103P37804	FUSIBLE	1/4W 2.2 Ω -J
⚠ R 563	103P39709	FUSIBLE	1/2W 0.82 Ω -J
⚠ R 565	103P44202	FUSE METAL	1W 560 Ω -K-OR-J
⚠ R 671	103P43709	FUSIBLE	2W 0.82 Ω -K-OR-J
R 901	102P08004	CEMENT WIRE	5W 4.7 Ω -K
⚠ R 911	103P37007	FUSIBLE	1/4W 33 Ω -J
⚠ R 912	103P39709	FUSIBLE	1/2W 0.82 Ω -J
⚠ R 975	103P39108	FUSIBLE	1/2W 270 Ω -J

CAPACITORS AND TRIMMERS

C 705	149D81101	CR-MULTIPLE	B50V 1000PF-M
⚠ C 901	189P09101	C-CERAMIC-AC	AC 400V E4700PF-M
⚠ C 902	189P09101	C-CERAMIC-AC	AC 400V E4700PF-M
⚠ C 903	189P06704	C-CERAMIC-AC	FZ VA1 0.01 μF-P
C 907	185D05602	ELECTROLYTIC-C	H400V1500 μF-M
⚠ C 991	189P03305	C-M-MF/PP-AC	AC125V/250V 0.1 μF-M
VC601	202P10903	TRIMMER CAPACITOR	5.5PF-30PF (CT-2146TX)
VC7701	202P10903	TRIMMER CAPACITOR	5.5PF-30PF (CT-2146TX)

SYMBOL NO.	PART NO.	DESCRIPTION	E

SWITCHES

S 701	432C04601	PUSH	
S 705	432P06603	KEY BOARD	(CT-2146TX)
S 711	432P06603	KEY BOARD	
S 712	432P06601	KEY BOARD	1-1
S 713	432P06601	KEY BOARD	1-1
S 714	432P06601	KEY BOARD	1-1
S 715	432P06601	KEY BOARD	1-1
S 716	432P06601	KEY BOARD	1-1
S 717	432P08505	KEY BOARD	
S 718	432P08506	KEY BOARD	
⚠ S 991	432C04801	PUSH	

MISCELLANEOUS

	338P01601	CPM ASSY	
⚠	449C03109	CRT SOCKET	
	641D75801	WEDGE	
⚠ F 991	283D04704	FUSE	2A-T
J 2E1	440C13601	PIN JACK BOARD 2P	
LC601	349P15905	CHROMA-BP TRANS.	
⚠ PC951	268P03901	PHOTO COUPLER	ON3105-V
SP391	480P63804	SPEAKER	
SP392	480P65303	SPEAKER	
X 601	285P06802	CRYSTAL RESONATOR	8.8MHz
X 7701	285P06202	CRYSTAL RESNATOR (CT-2146TX)	13.875MHz
X 7702	285P06402	CRYSTAL RESNATOR (CT-2146TX)	6.000MHz
X 7703	285P06402	CRYSTAL RESNATOR (CT-2146TX)	6.000MHz
Z 701	939P16405	REMOCON PREAMP UNIT	
⚠ Z 901	299P08705	PROTECTOR	
⚠ Z 902	299P08701	PROTECTOR	(CT-2146TX)

PRINTED CIRCUIT BOARDS

⚠	920A35501	CTV PCB ASSY	(CT-2145BM)
⚠	920A35502	CTV PCB ASSY	(CT-2146TX)
⚠	930C24601	AV PCB ASSY	(CT-2146TX)
⚠	930C24701	CRT PCB ASSY	(CT-2145BM)
⚠	930C24702	CRT PCB ASSY	(CT-2146TX)
⚠	930B31001	FASTEXT PCB ASSY	(CT-2146TX)

MECHANICAL PARTS

669D21201	SCREW	(10P)	
669D22102	SCREW	SCREW-TB (10P)	
669D22104	SCREW	SCREW-TB (10P)	(CT-2146TX)
669D22106	SCREW	SCREW-TB (10P)	

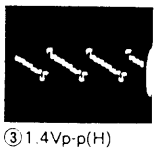
SYMBOL NO.	PART NO.	DESCRIPTION	
		COSMETIC PARTS	
⚠	246C02202	AC POWER CORD	
⚠	700A21202	BACK COVER	(CT-2146TX)
	700A35501	CABINET FRONT	(CT-2145BM)
	700A35502	CABINET FRONT	(CT-2146TX)
⚠	700C08207	BACK COVER	(CT-2145BM)
	702C56904	PLAT	
	702C75103	DOOR (CT-2146TX)	
	702C75104	DOOR (CT-2145BM)	
	704C41207	POWER KNOB	
	704D83601	PUSH KNOB	
	709D05104	HANDLE	
	761B15401	TERMINAL BOARD	
	761C27301	DOOR CATCH	
		PACKING PARTS AND ACCSESSORY	
	802C86001	PACKING CASE	(CT-2145BM)
	802C86002	PACKING CASE	(CT-2146TX)
	803B60001	PACKING CUSHION	
	829D12601	PACKING SHEET	
	831B02100	PACKING BAG	
	831D11009	PACKING BAG	
	871C82106	INSTRUCTION BOOK	(CT-2145BM)
	871C82107	INSTRUCTION BOOK	(CT-2146TX)
⚠	939P19101	REMOTE HAND UNIT	(CT-2145BM)
⚠	939P21201	REMOTE HAND UNIT	(CT-2146TX)
	871C34205	SERVICE MANUAL	

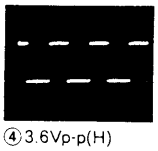
SYMBOL NO.	PART NO.	DESCRIPTION

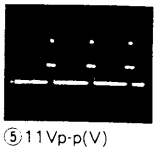
CHASSIS WAVEFORMS

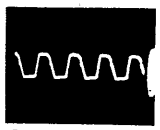
①1.8Vp-p(H)

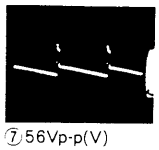
②5.8Vp-p(H)


③1.4Vp-p(H)

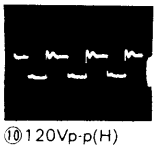

④3.6Vp-p(H)

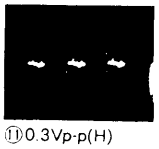

⑤11Vp-p(V)

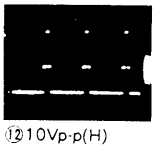

⑥20Vp-p(H)

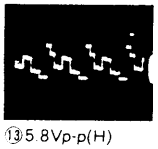

⑦56Vp-p(V)

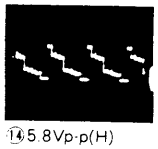
⑧2.8Vp-p(V)

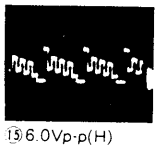

⑩120Vp-p(H)

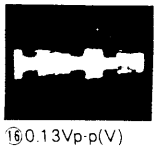

⑪0.3Vp-p(H)


⑫10Vp-p(H)

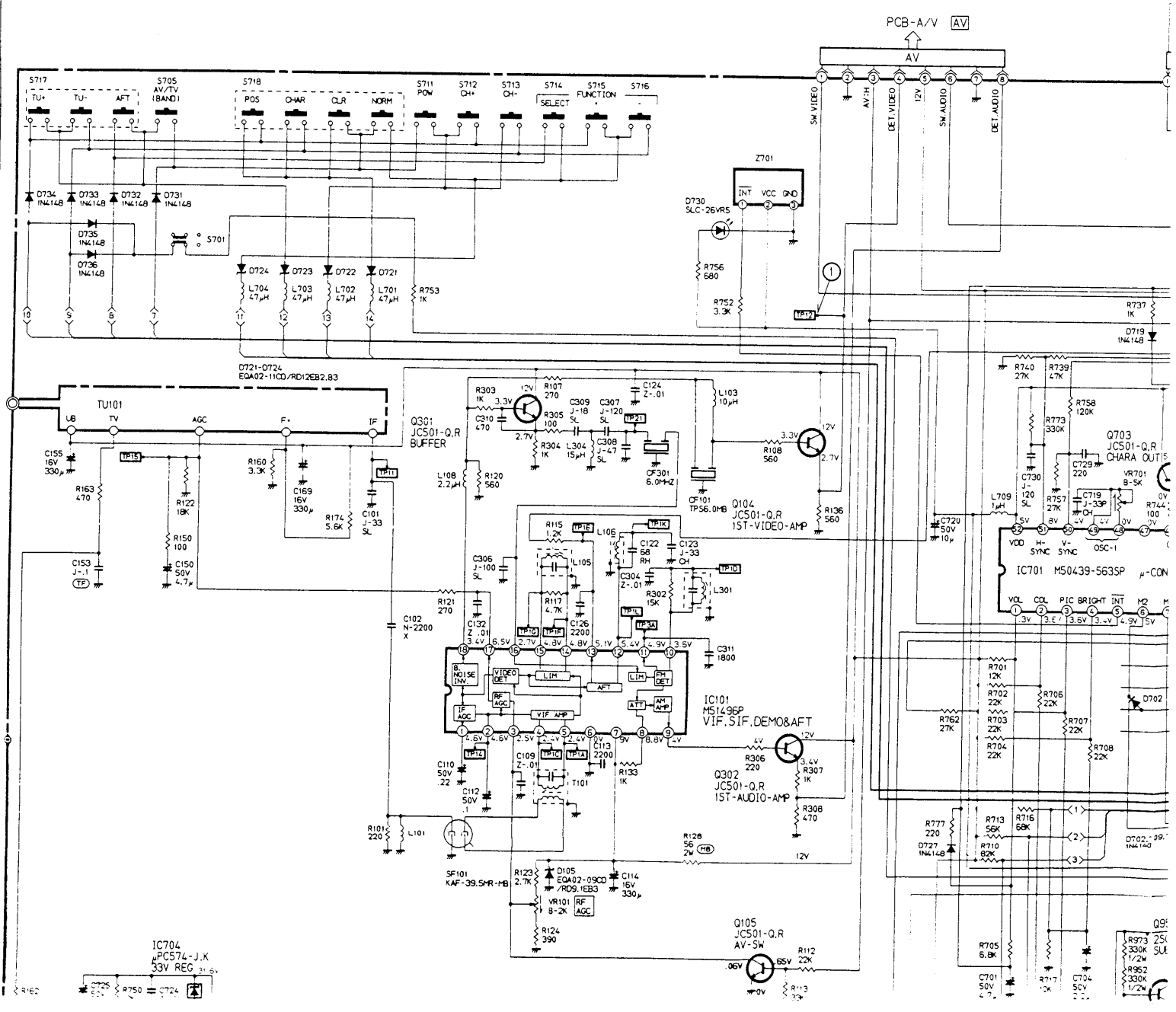

⑬5.8Vp-p(H)


⑭5.8Vp-p(H)


⑮6.0Vp-p(H)


⑯0.13Vp-p(V)

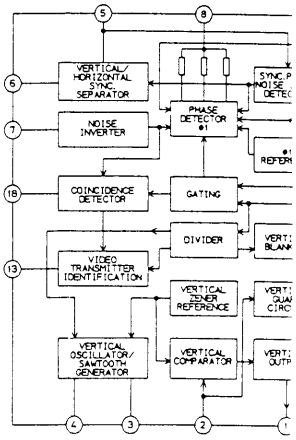
⑰0.18Vp-p(H)



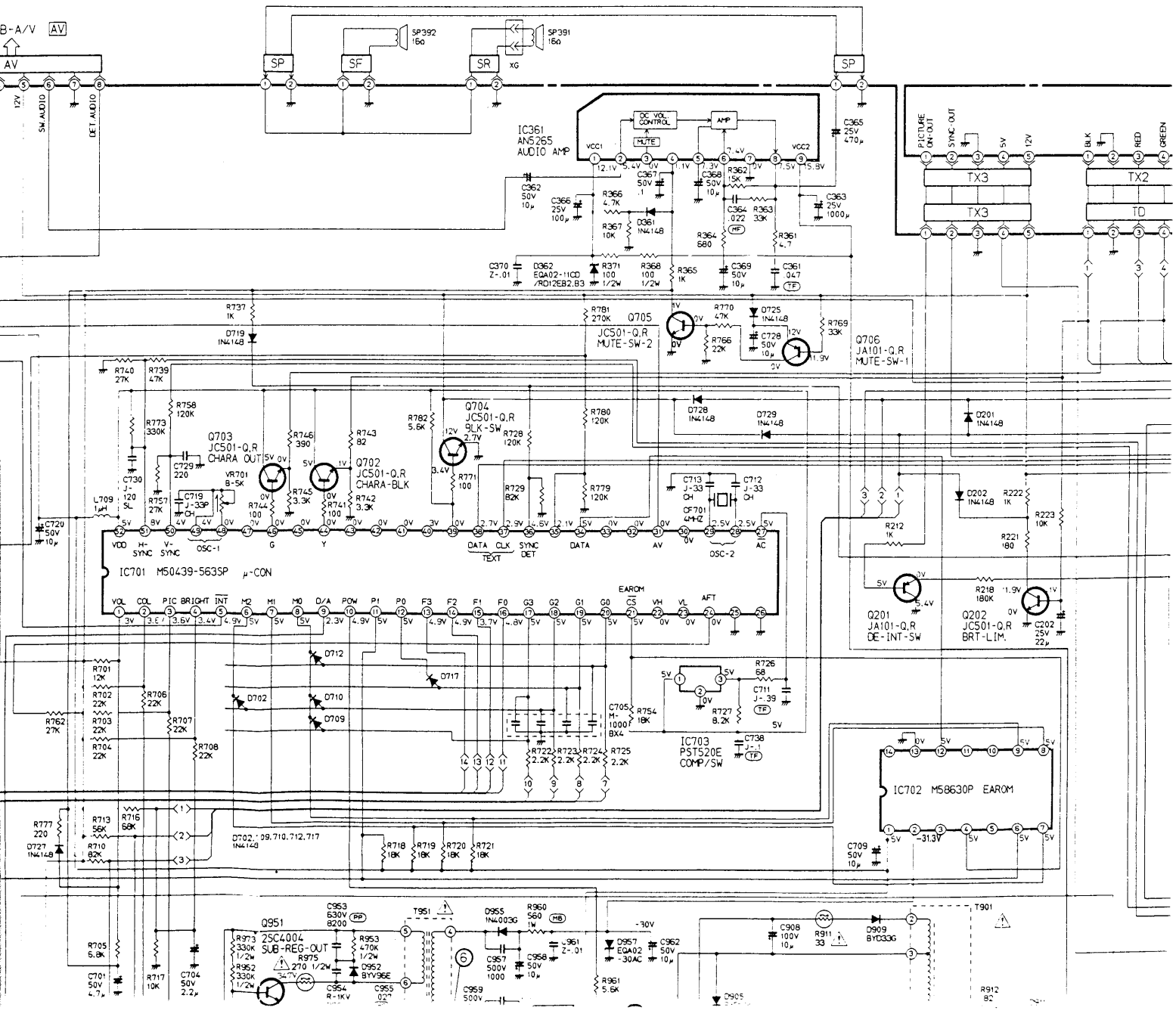
SCHEMATIC DIAGRAM MODEL : CT-2146TX

⑦ 56Vp-p(V) ⑧ 2.8Vp-p(V) ⑨ 1.4Vp-p(H)

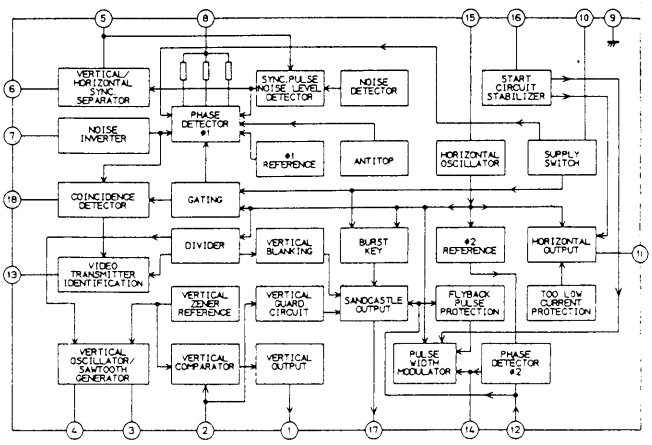
⑯ 0.13Vp-p(V) ⑰ 0.18Vp-p(H) ⑱ 1.2Vp-p(H)



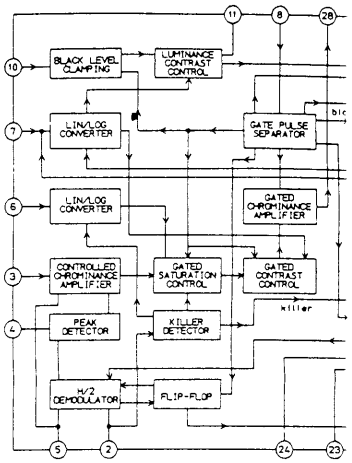
IC501
TDA2579



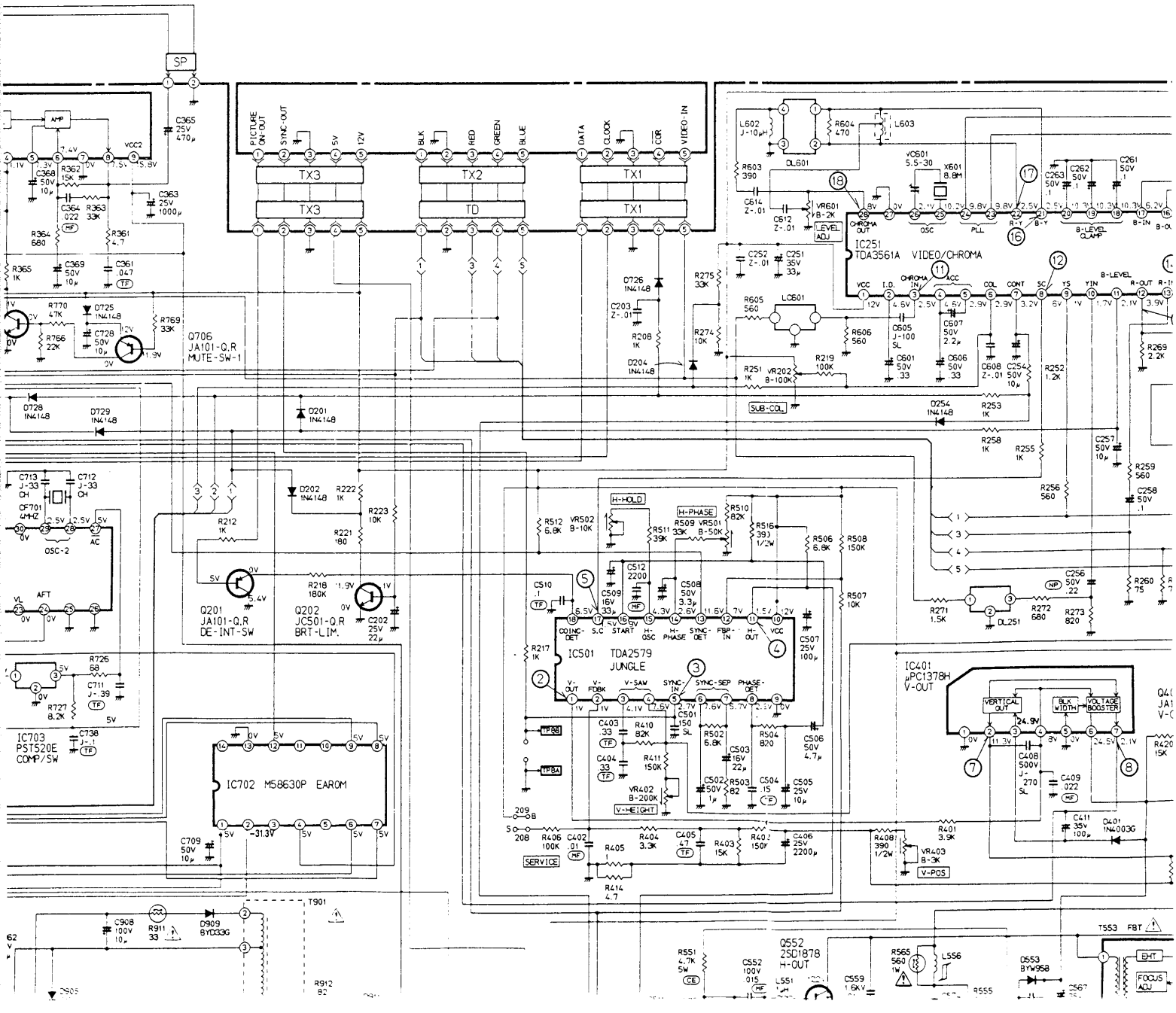
EL : CT-2146TX

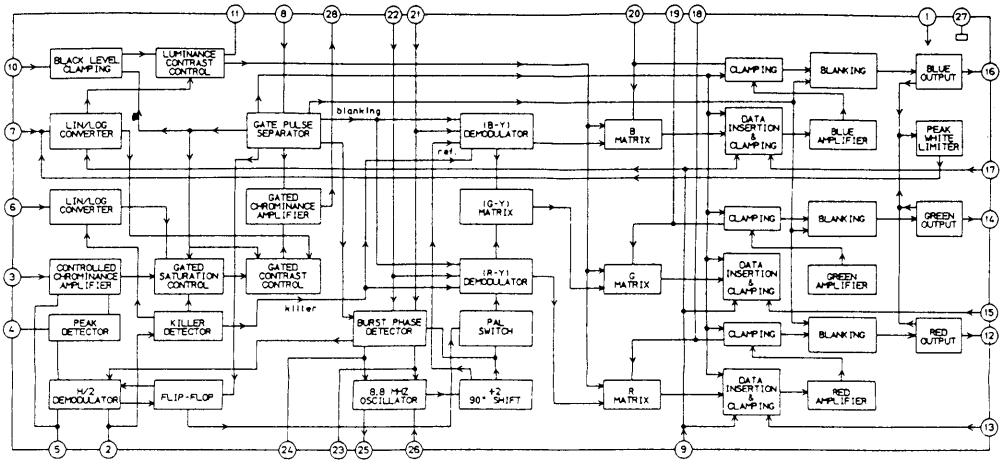


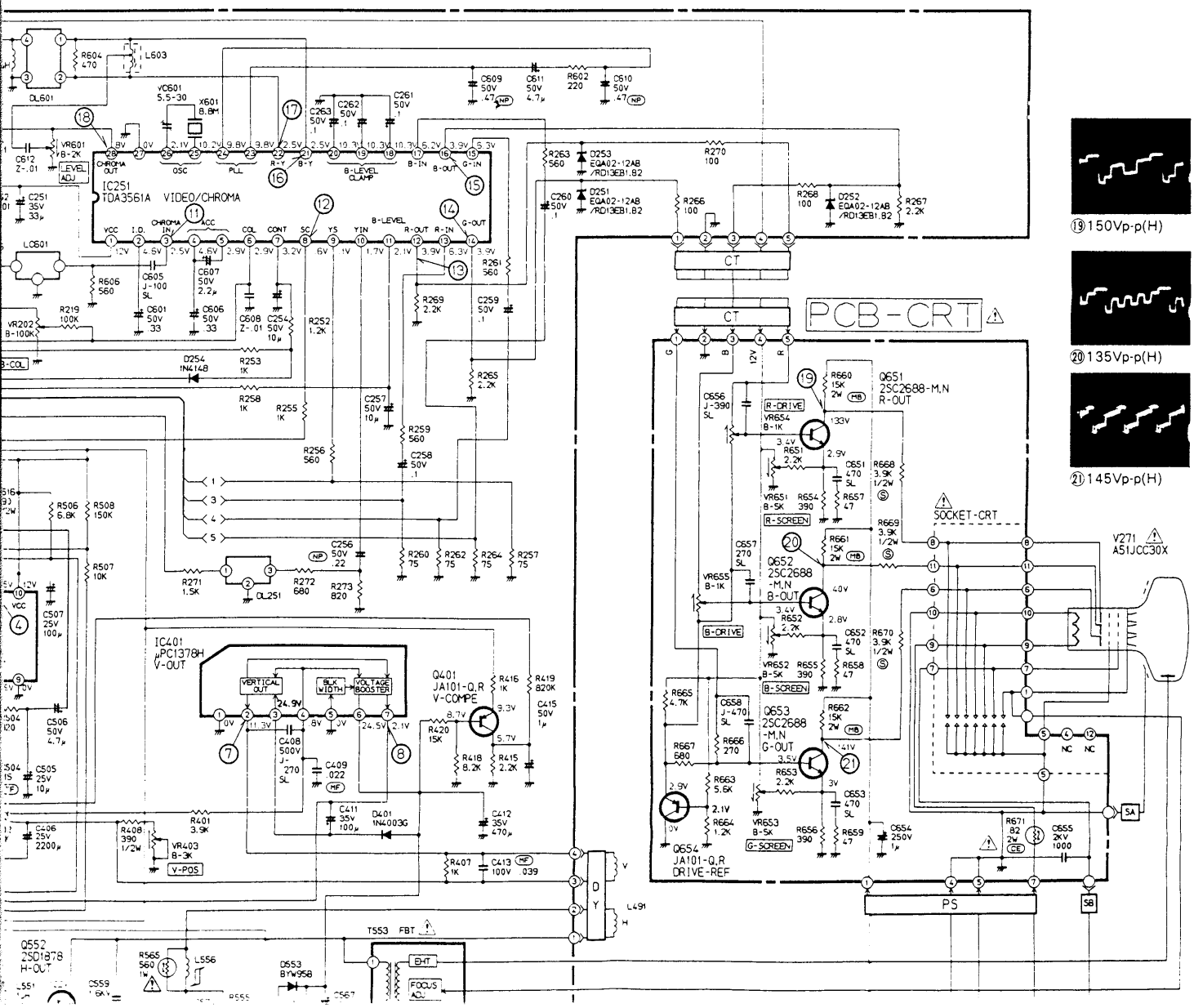
IC501
TDA2579



IC251
TDA3561A



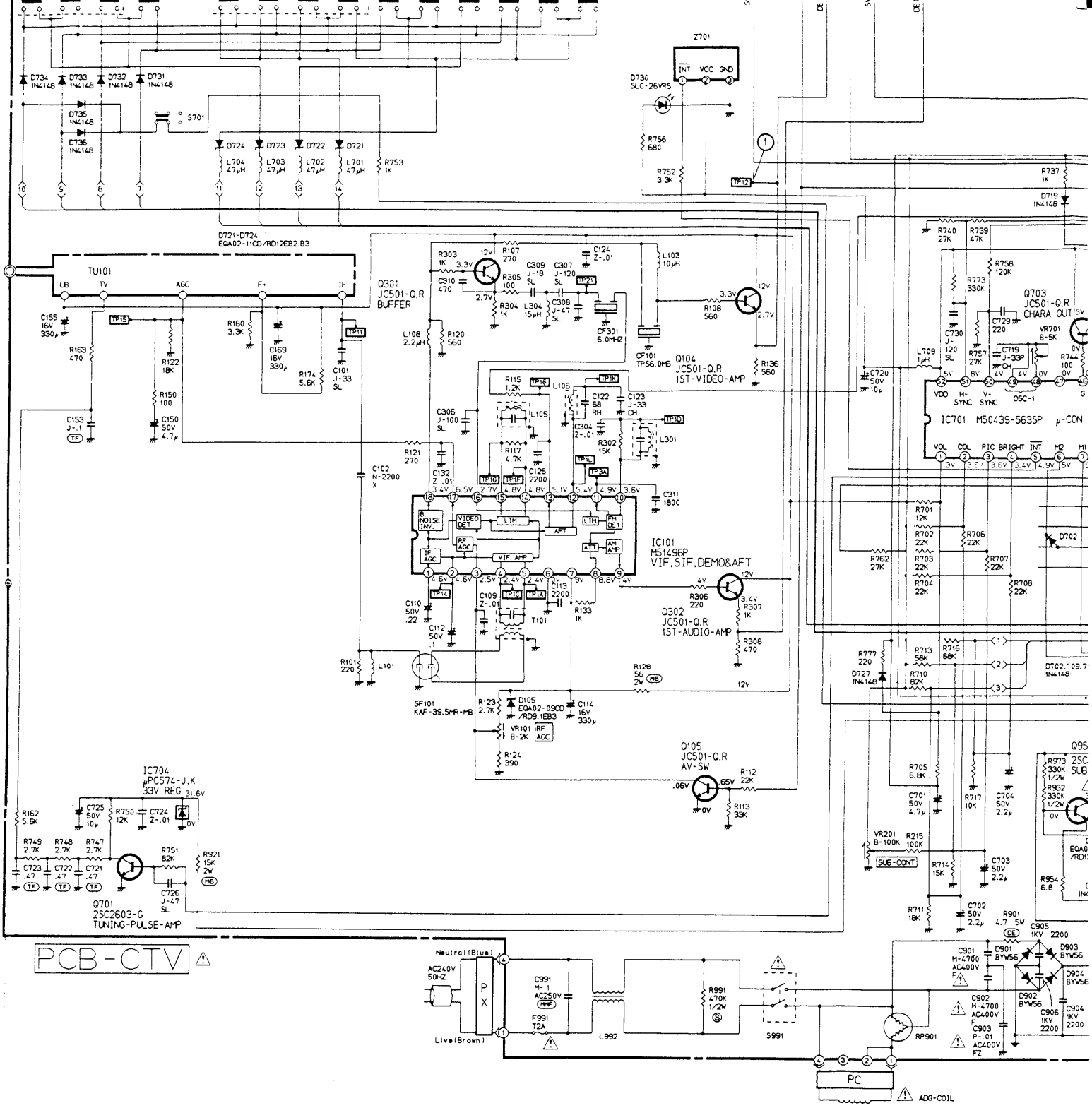




⑲150Vp-p(H)

⑳135Vp-p(H)

㉑145Vp-p(H)



⚠ SERVING PRECAUTION

SYMBOLS INDICATE COMPONENTS HAVING SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY AND PERFORMANCE. THERFORE REPLACEMENT OF ANY SAFETY PARTS SHOULD BE IDENTICAL IN VALUE AND CHARACTERISTICS. FOR ACCURACY OF THE REPLACEMENT REFER TO THE PARTS LIST OF SERVICE MANUAL.

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NOTE 1:

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   Accordingly, K = 1000 ohms
   M = 1000K ohms.
2. The wattage of resistors, if not specifically designated, is less than 1/4 watt.
3. Resistors, if not specifically designated, are carbon resistors.
4. The marks of resistors are as follows:
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   - (MPC) : Metal plate cement resistor.
   - (ML) : Metal linear resistor.
   - (S) : Fixed composition resistor
   - (W) : Wire wound resistor
   - (M) : Metal film resistor
5. The tolerance of resistor value, if not specifically designated, is: ±5%, K = ±10% M = ±20%
6. The unit of capacitance, if not specifically designated, is:
   a) μF, for numbers less than 1
   b) PF, for numbers more than 1
7. Capacitors, if not specifica
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8. The marks of capacitors are
   - (ALM) : Aluminus elec
   - (MF) : Polyester cap
   - (PP) : Polypropylen
   - (TANT) : Tantalum cap
   - (TF) : Twin film cap
   - (MF.PP) : Polyester pol
   - (MPP) : Metallize plas
   - (NP) : Non polarized
   - (PS) : Styrol capacit
   - (SC) : Semi conduct
   - ⏚ : Electrolytic ca
9. The DC working voltage of
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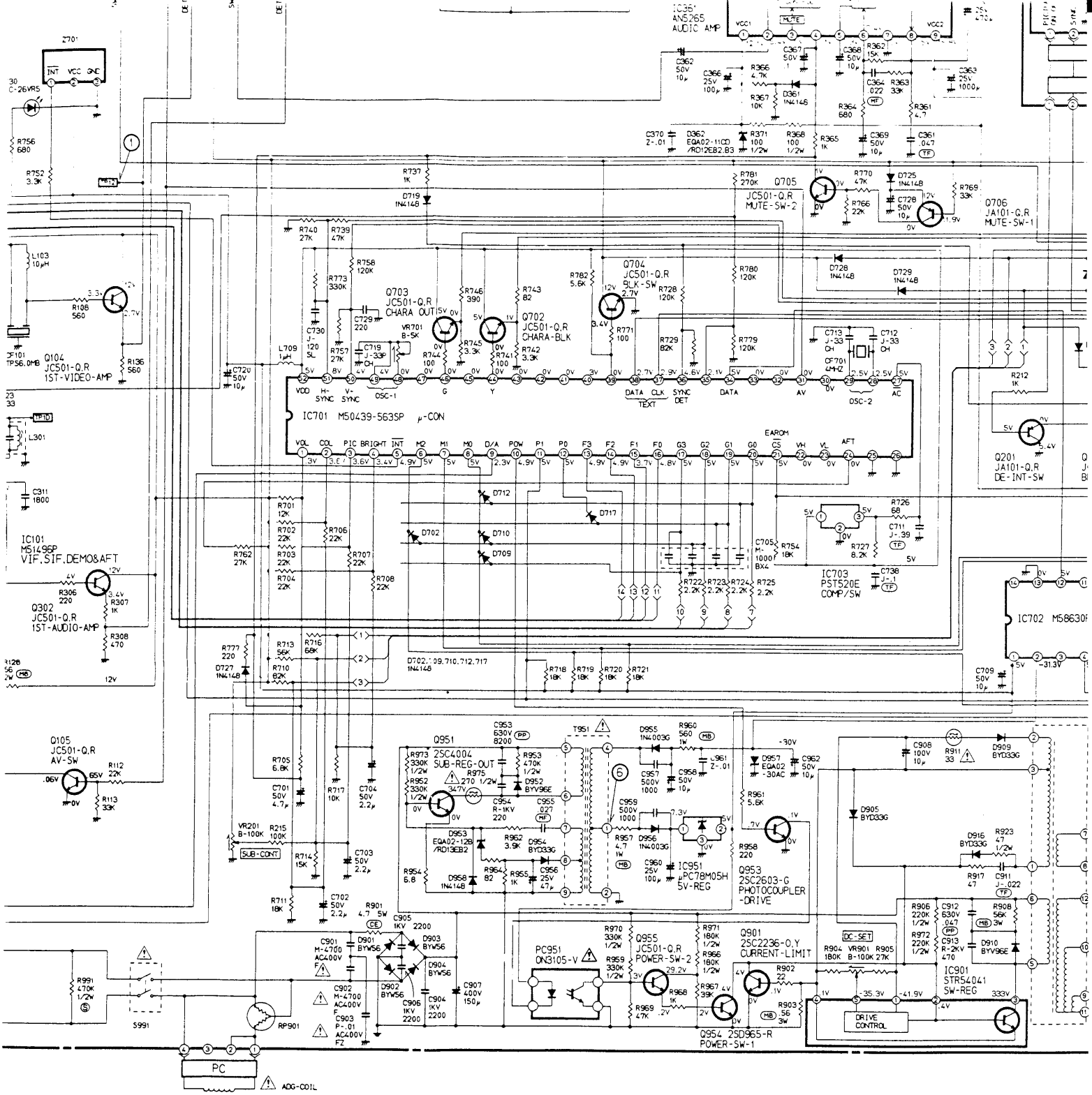

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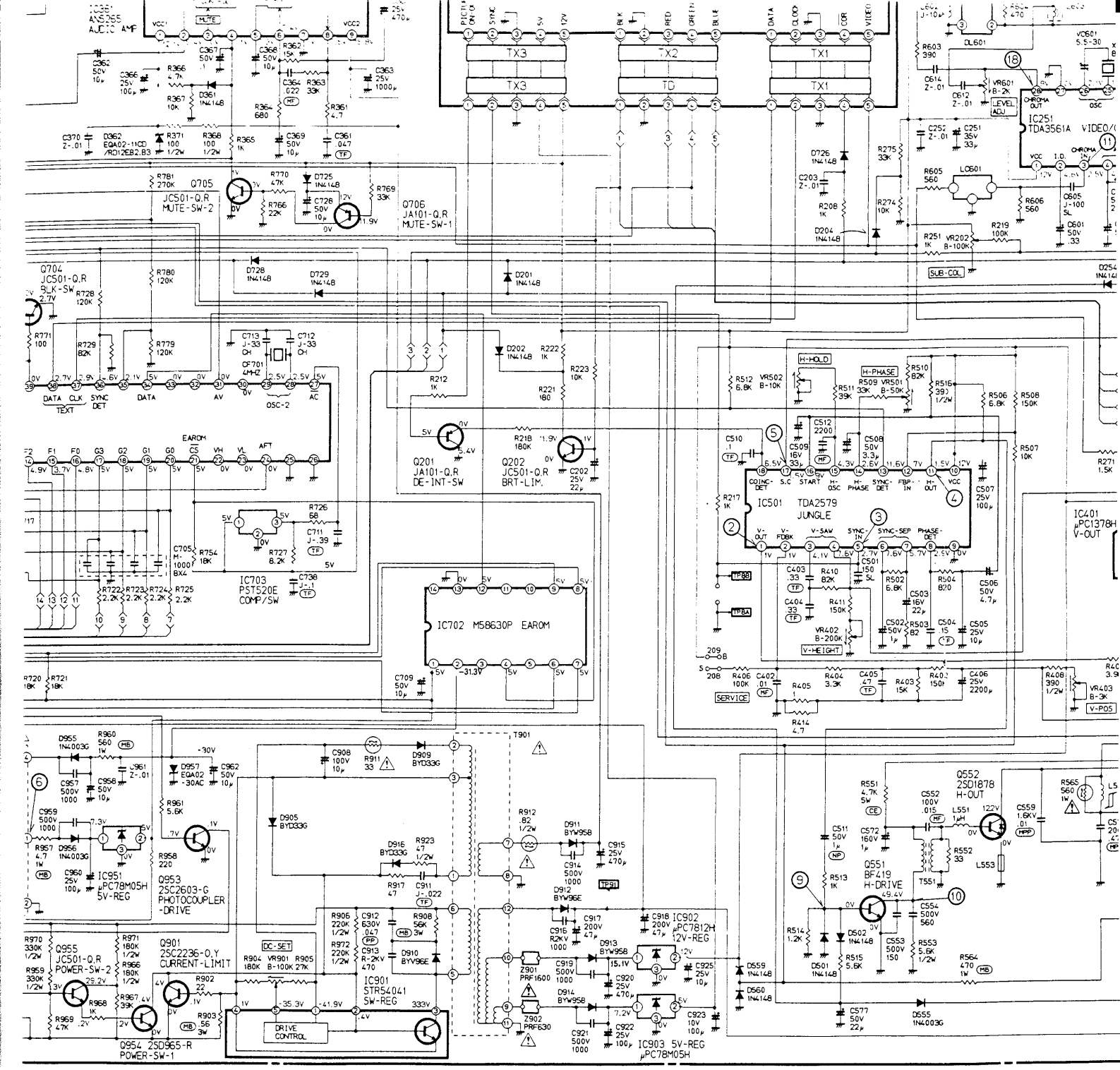
MF,PP	:	Polyester polypropylene film capacitor.
MPP	:	Metallize plastic film capacitor.
NP	:	Non polarized electrolytic capacitor.
PS	:	Styrol capacitor.
SC	:	Semi conductor capacitor.
	:	Electrolytic capacitor

9. The DC working voltage of capacitor, if not specifically designated is: 50V

10. The tolerance of capacitor value, if not specifically designated is: ±10% for polyester capacitor
±5% for ceramic capacitor
and J = ±5% K = ±10% M = ±20% P = $^{+100\%}_{-0\%}$
C = ±0.25PF D = ±0.5PF F = ±1PF Z = $^{+80\%}_{-20\%}$ N = ±30%

SPECIFIC SYMBOL

	Zener Diode		Varistor
	Varicap		Crystal unit
	Posistor		Air Gap
	Thermistor		Part (resistor) attached on the copper-foil side of PCB
	Fusible Resistor		Ceramic filter



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NOTE 2:

1. DC voltages were measured from points indicated to the circuit ground with a high-Z voltmeter.
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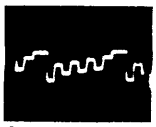
3. This is a basic schematic diagram. Some sets may be subject to modification according to engineering improvement.

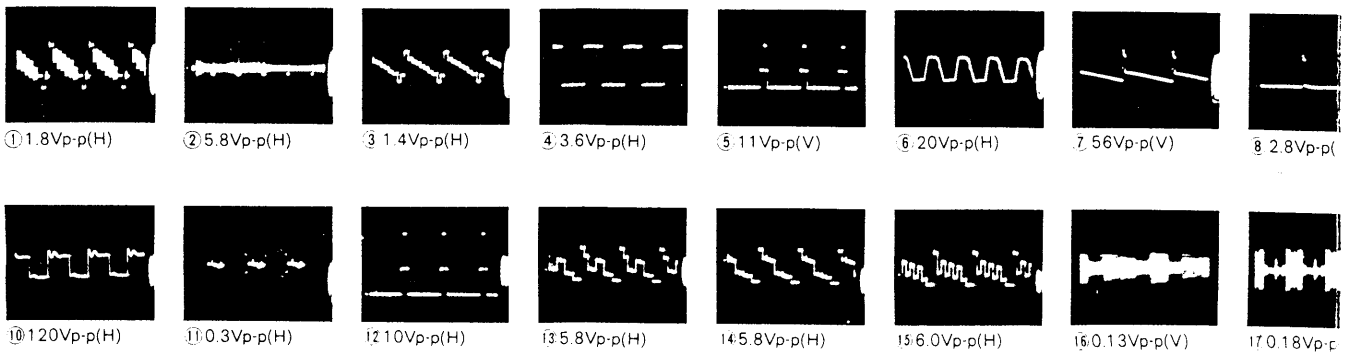
⑲ 150Vp-p(H)



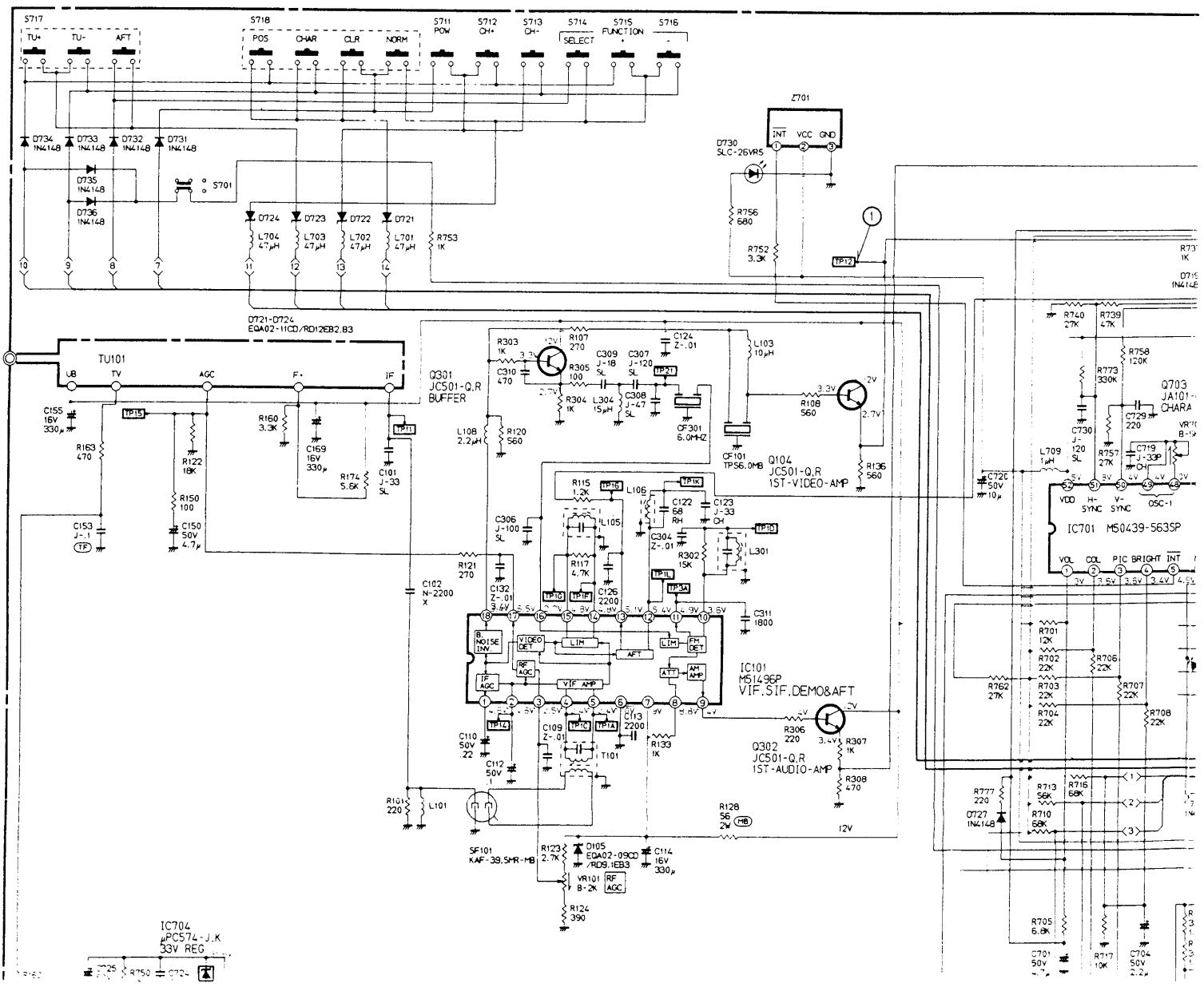
⑳ 135Vp-p(H)

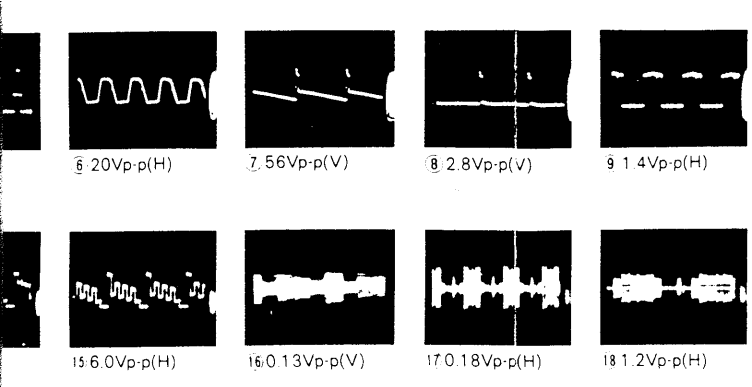
㉑ 145Vp-p(H)

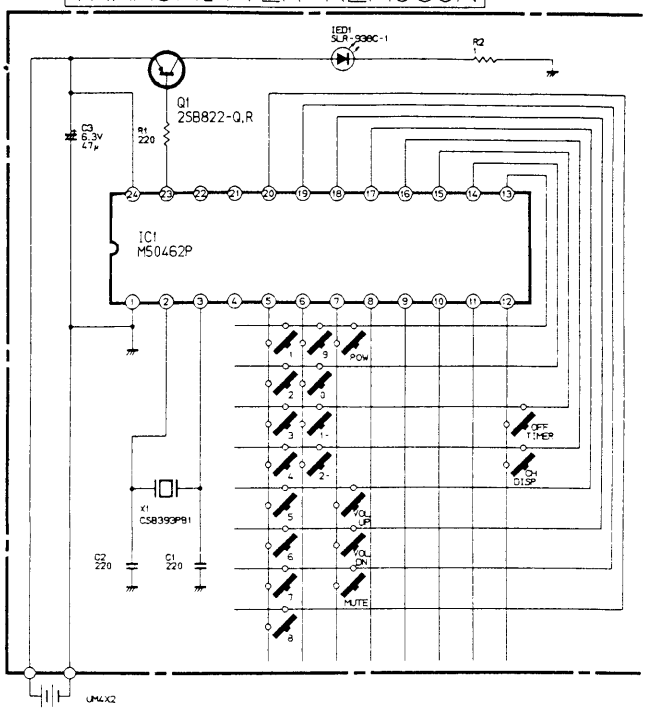
CHASSIS WAVEFORMS

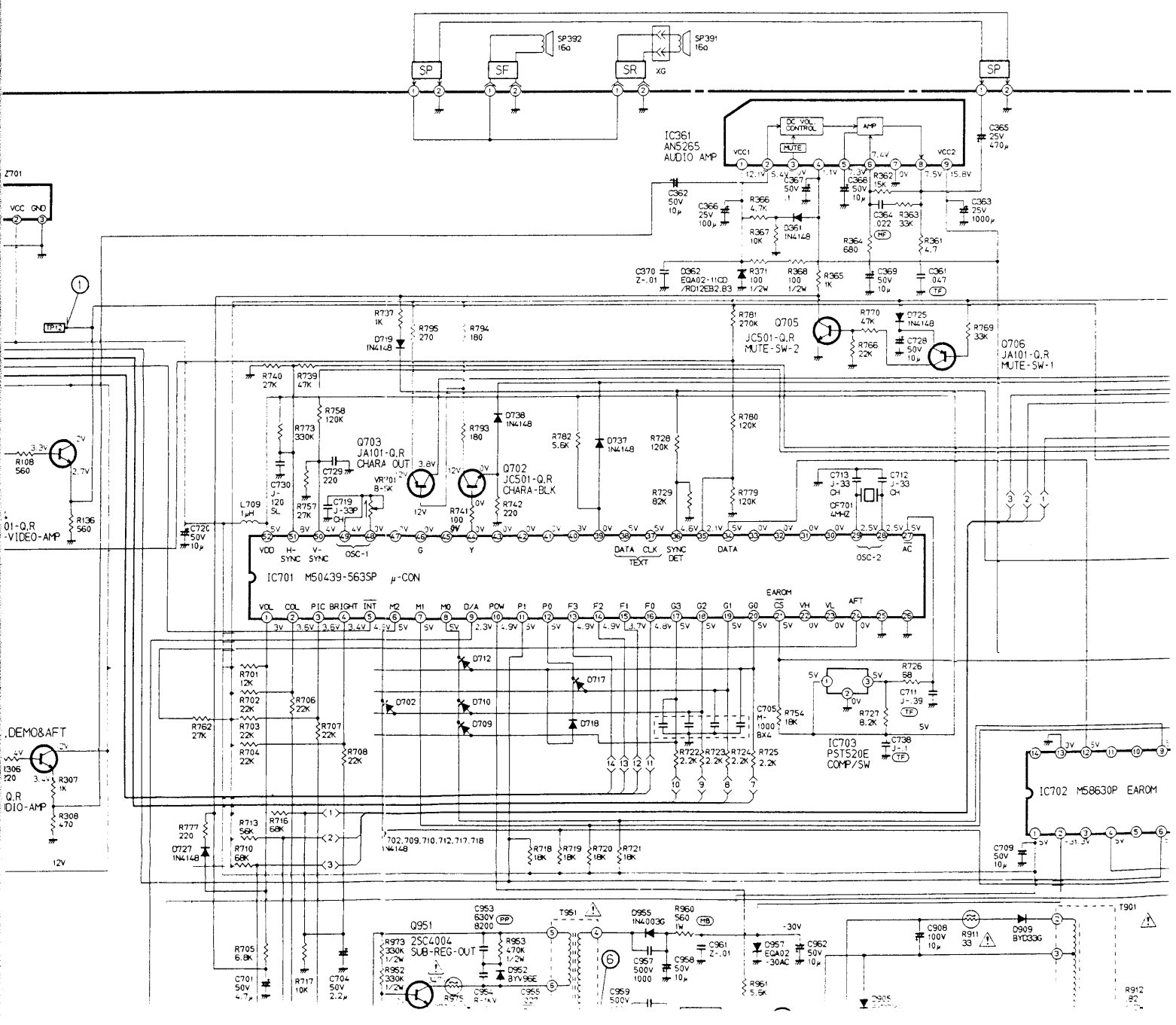


① 1.8Vp-p(H)
② 5.8Vp-p(H)
③ 1.4Vp-p(H)
④ 3.6Vp-p(H)
⑤ 11Vp-p(V)
⑥ 20Vp-p(H)
⑦ 56Vp-p(V)
⑧ 2.8Vp-p(
⑩ 120Vp-p(H)
⑪ 0.3Vp-p(H)
⑫ 10Vp-p(H)
⑬ 5.8Vp-p(H)
⑭ 5.8Vp-p(H)
⑮ 6.0Vp-p(H)
⑯ 0.13Vp-p(V)
⑰ 0.18Vp-p



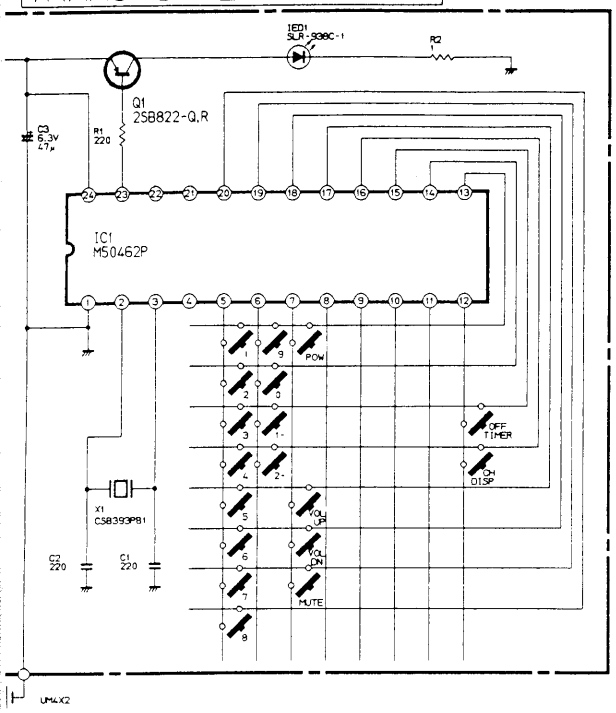

6 20Vp-p(H)
7 56Vp-p(V)
8 2.8Vp-p(V)
9 1.4Vp-p(H)
15 6.0Vp-p(H)
16 0.13Vp-p(V)
17 0.18Vp-p(H)
18 1.2Vp-p(H)

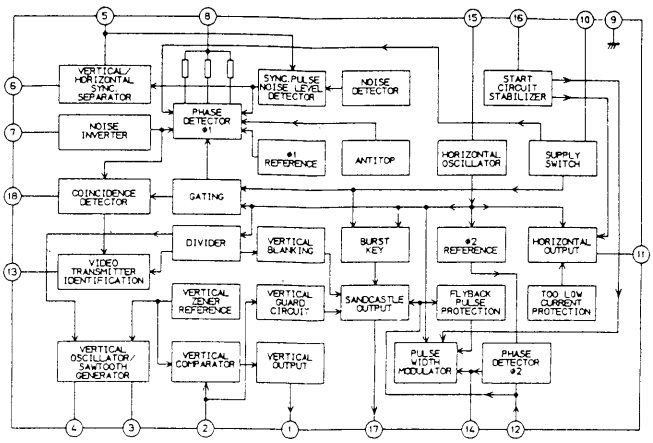

TRANSMITTER-REMOCON
LED1 SLR-336C-1
R2
Q1 2SB822-Q,R
C3 6.3V 47μ
R1 220
IC1 M50462P
POW
OFF TIMER
CH DISP
VOL UP
VOL DN
MUTE
X1 CSB393P81
C2 220
C1 220
UM4X2


SP SF SR XG SP
SP392 16Ω
SP391 16Ω
IC361 AN5265 AUDIO AMP
DC VOL CONTROL
AMP
MUTE
VCC1
VCC2
Z701
VCC GND
TP12
Q705 JC501-Q,R MUTE-SW-2
Q706 JA101-Q,R MUTE-SW-1
Q703 JA101-Q,R CHARA OUT
Q702 JC501-Q,R CHARA-BLK
IC701 M50439-563SP μ-CON
VDD H-SYNC V-SYNC OSC-1 G Y DATA CLK SYNC DET TEXT DATA OSC-2 AC
VOL COL PIC BRIGHT INT M2 M1 M0 D/A POW P1 P0 F3 F2 F1 F0 G3 G2 G1 G0 CA EAROM VH VL AFT
IC703 PST520E COMP/SW
IC702 M58630P EAROM
Q951 2SC4004 SUB-REG-OUT
T951
T901
D727 1N4148
D702.709.710.712.717.718 1N4148
12V
-30V

TRANSMITTER-REMOCON

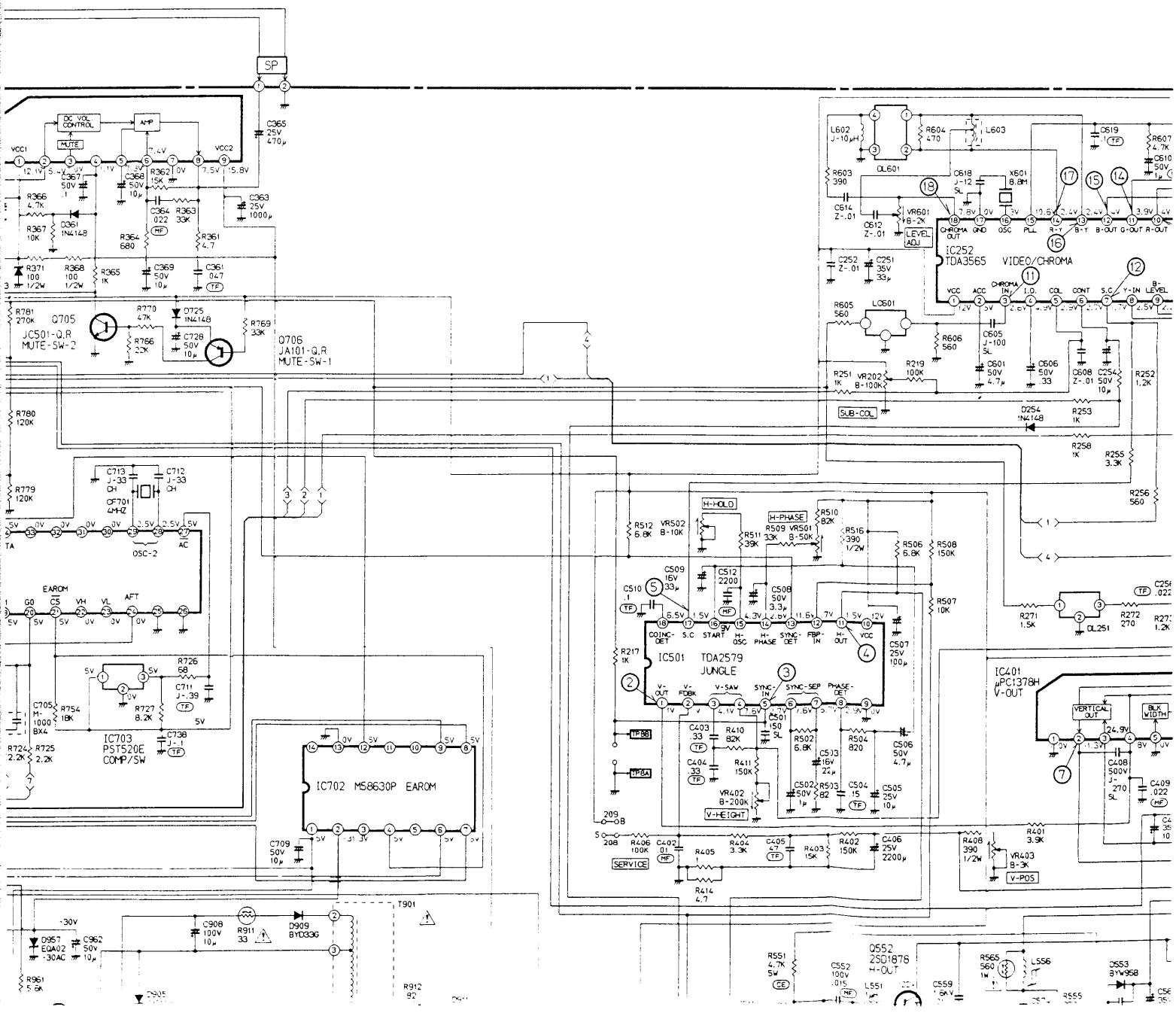
SCHEMATIC DIAGRAM MODEL : CT-2



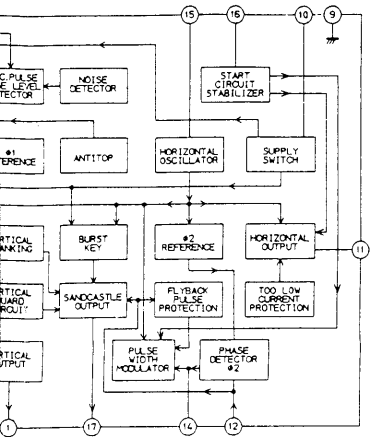


IC501
TDA2579

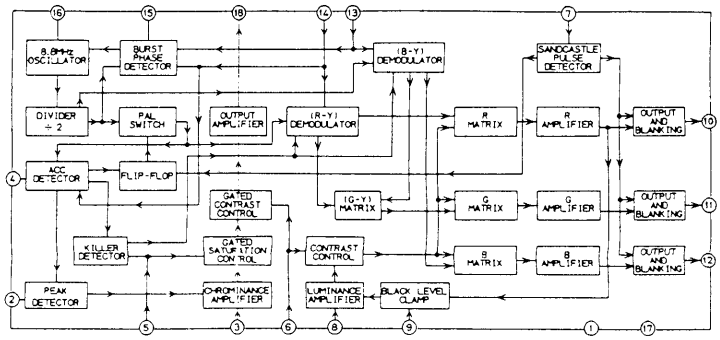
IC2
TDA

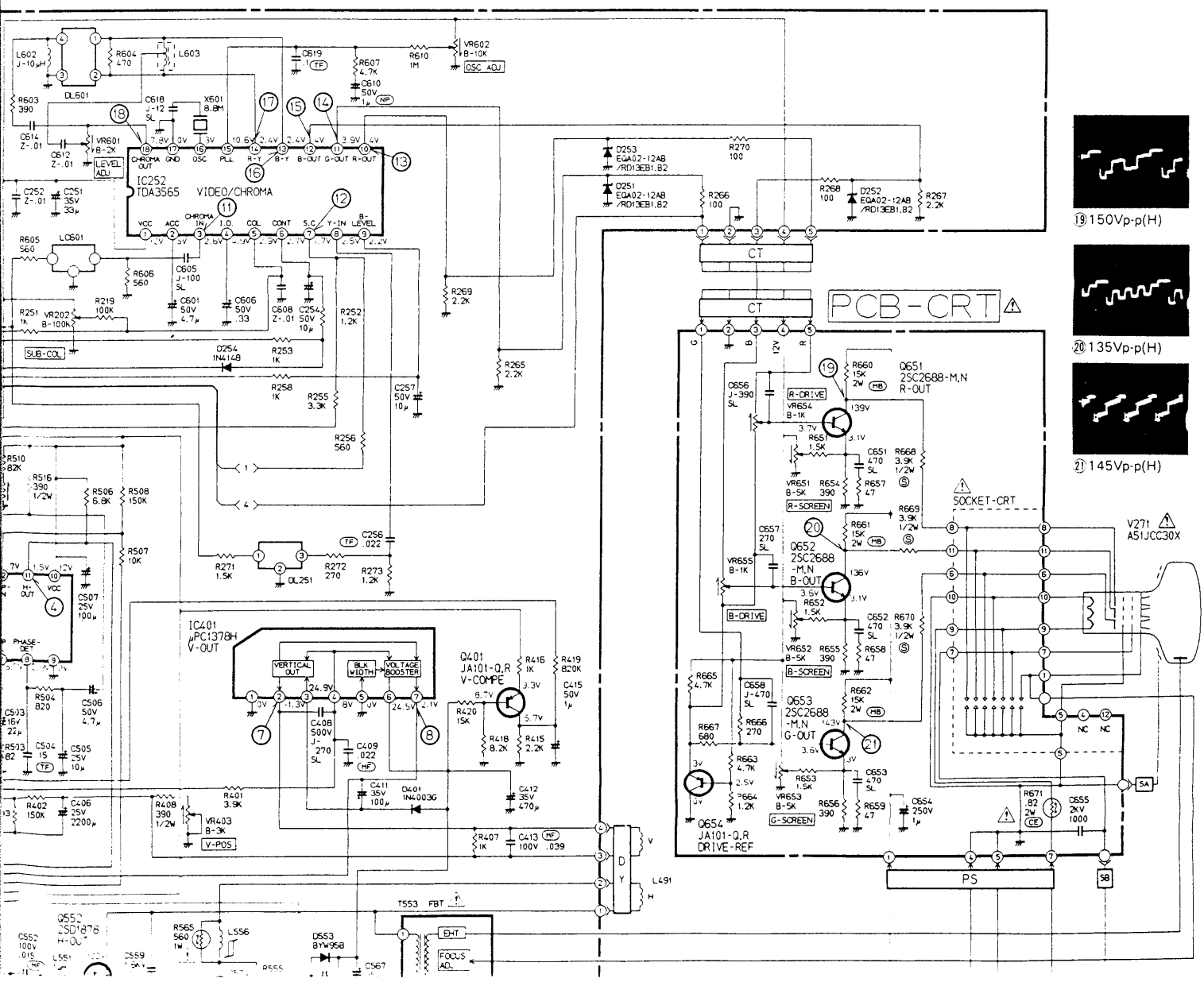


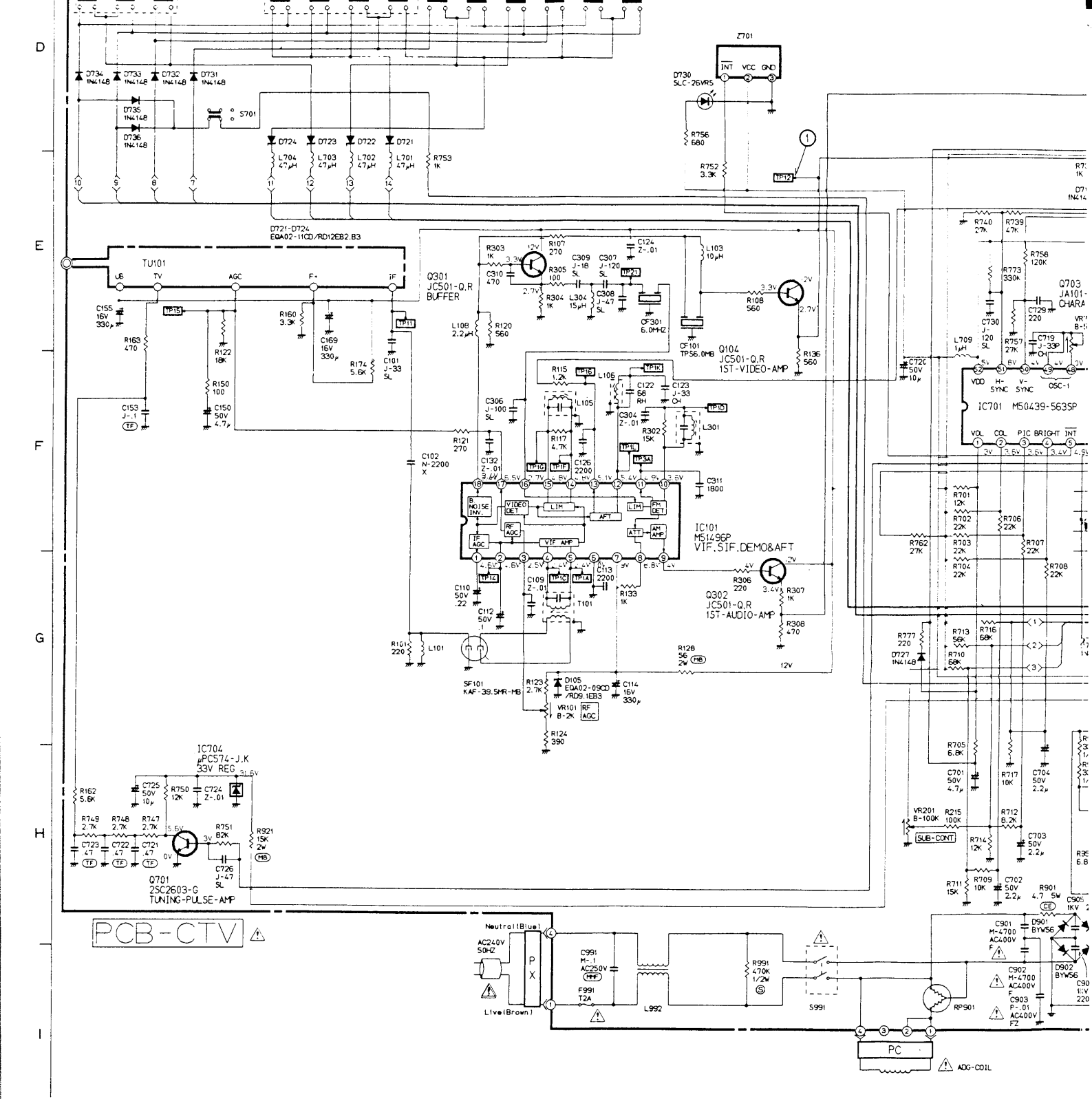
RAM MODEL : CT-2145BM



IC252
TDA3565







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6. The unit of capacitance, if not specifically designated, is:
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   - (PP) : Polypr
   - (TANT) : Tantalu
   - (TF) : Twin fi
   - (MF.PP) : Polyest
   - (MPP) : Metalli
   - (NP) : Non po
   - (PS) : Styrol
   - (SC) : Semi c
   - ✱ : Electrol
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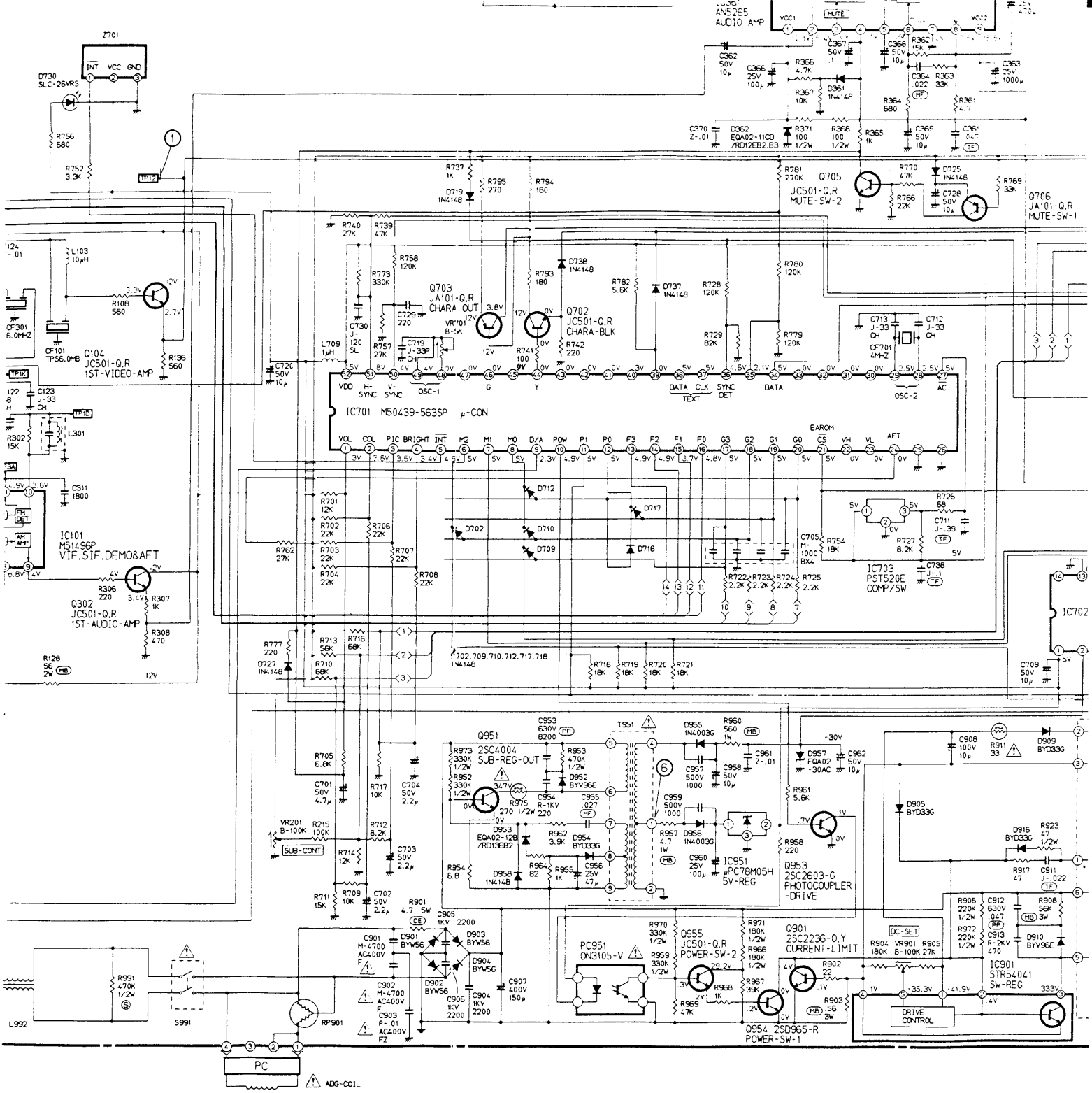

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⏚	:	Electrolytic capacitor

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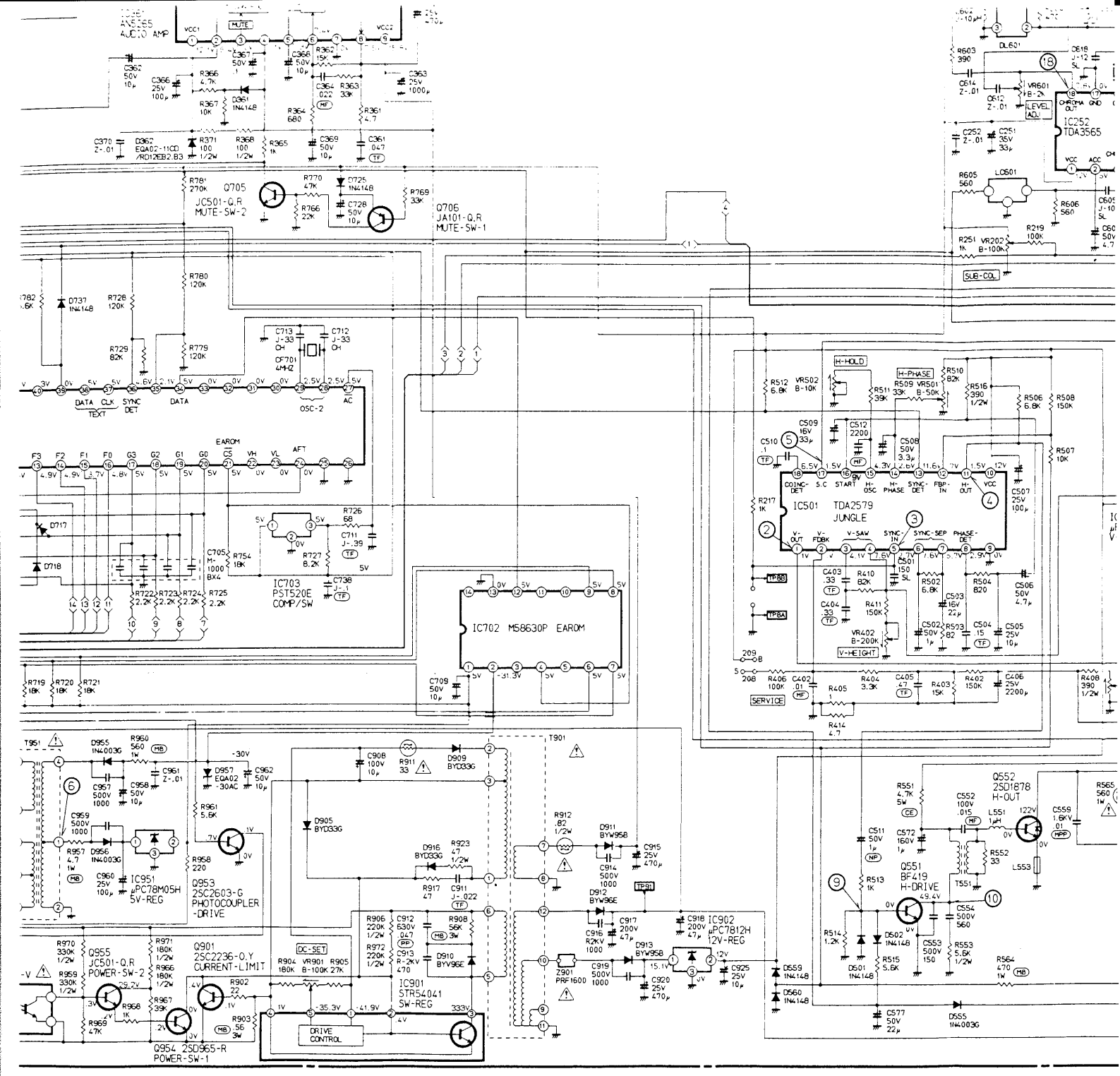
10. The tolerance of capacitor value, if not specifically designated is: ±10% for polyester capacitor
±5% for ceramic capacitor
and J =±5% K =±10% M =±20% P = $^{+100\%}_{-0\%}$
C =±0.25PF D =±0.5PF F =±1PF Z = $^{+80\%}_{-20\%}$ N = ±30%

SPECIFIC SYMBOL

	Zener Diode		Varistor
	Varicap		Crystal unit
	Posistor		Air Gap
	Thermistor		Part (resistor) attached on the copper-foil side of PCB
	Fusible Resistor		Ceramic filter



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Thermistor	Part (resistor) attached on the copper-foil side
Fusible Resistor	of PCB
	Ceramic filter

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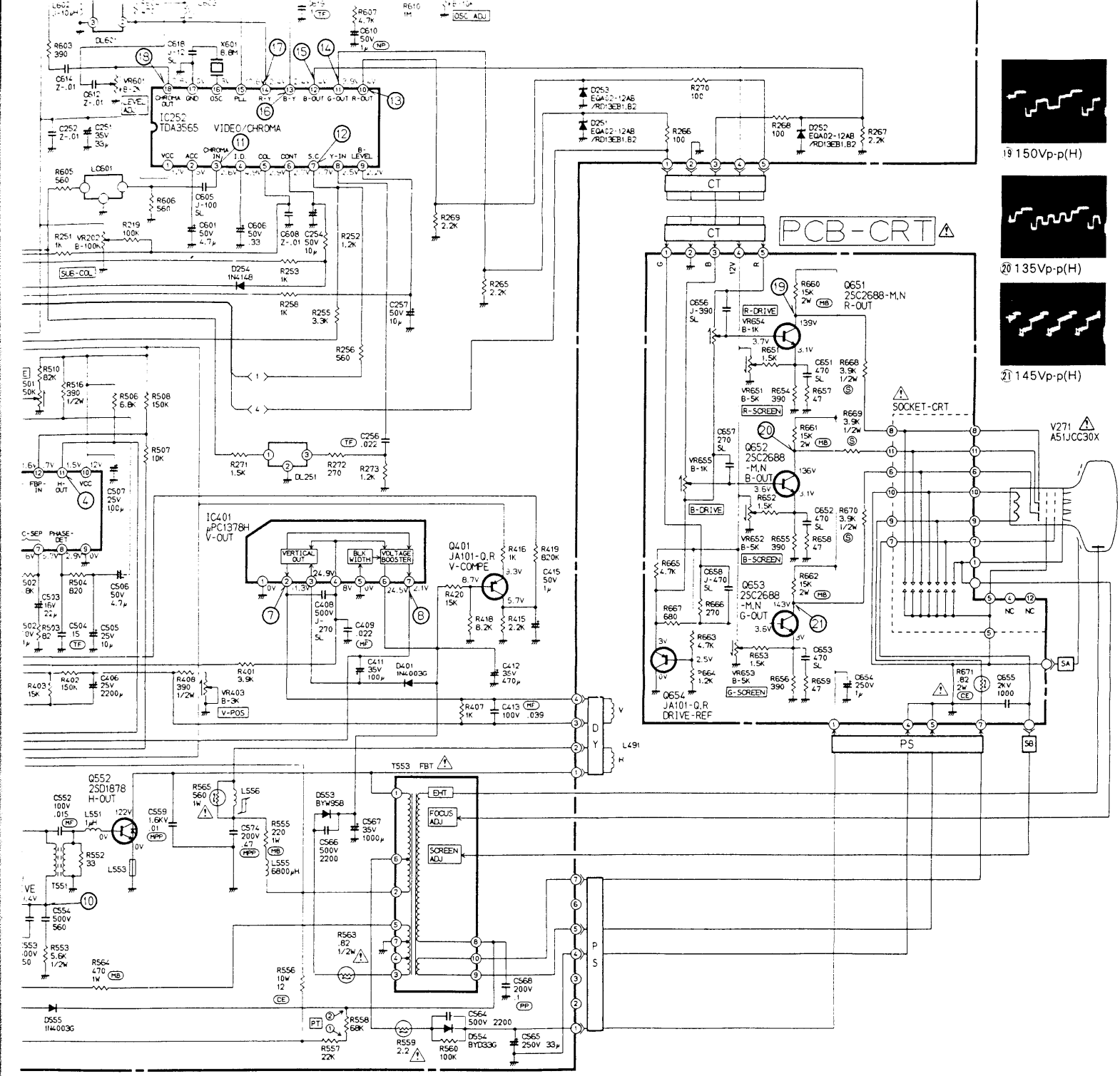
IC252
TDA3565
VIDEO/CHROMA
IC401
μPC1378H
V-OUT
Q401
JA101-Q,R
V-COMPE
Q552
2SD1878
H-OUT
Q651
2SC2688-M,N
R-OUT
Q652
2SC2688
-M,N
B-OUT
Q653
2SC2688
-M,N
G-OUT
Q654
JA101-Q,R
DRIVE-REF
PCB-CRT
SOCKET-CRT
V271
A51JCC30X
CT
PS
DY
T553 FBT
L491
19 150Vp-p(H)
20 135Vp-p(H)
21 145Vp-p(H)